

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

*In re* Application of:

Issam RAAD, Hend A. HANNA, and Nabeel  
NABULSI

Group Art Unit: 1744

Examiner: Chin, Brad Y.

Serial No.: 10/044,842

Atty. Dkt. No.: UTSC:669US

Filed: January 11, 2002

For: NOVEL ANTISEPTIC DERIVATIVES  
WITH BROAD SPECTRUM  
ANTIMICROBIAL ACTIVITY FOR THE  
IMPREGNATION OF SURFACES

**DECLARATION OF ISSAM RAAD, HEND HANNA, AND NABEEL NABULSI UNDER  
37 C.F.R. § 1.131.**

We, Issam Raad, Hend A. Hanna, and Nabeel Nabulsi, hereby declare as follows:

1. We are the named inventors for the above-referenced patent application.
2. Prior to September 25, 1998, we conceived of the idea of the idea of preparing compositions that include a basic reagent and a dye, and methods for disinfecting or sterilizing a surface that involve applying to the surface a composition that includes a basic reagent and a dye.
3. As evidence of conception of the invention, attached as Exhibits 1-6 are copies a literature searches we conducted to assess what was known in the literature pertaining to certain anti-infective agents, two of which chlorhexidine and berberine. Our idea was to combine these

agents in a single composition, and to coat the surface of medical devices (such as central venous catheters) with these compositions in an effort to inhibit the growth of microbacterial organisms that cause device-related infections. The date of this search was prior to September 25, 1998. Berberine, one of the agents that we searched in our review of the literature, is a yellow plant dye. Chlorhexidine, another of the agents search in the literature review, is a basic reagent.

4. Furthermore, from prior September 25, 1998 until we filed our provisional application on January 12, 2001, we were diligent in conducting studies to prepare compositions of our invention and evaluate their effectiveness as antimicrobial compositions.

5. During this period, there was continual activity on our lab on this project. As evidence of this activity, we provide Exhibits 7-16, which include additional literature searches for basic reagents and dyes (7-15).

6. Also provide is a summary of experiments performed after September 25, 1998, but prior to January 12, 2001, which showed the efficacy of combining various basic reagents and dye (16).

7. In this regard, references to "Gendine" are to a combination of Gentian violet (also noted at "Gv") and chlorhexidene), and reference to "PCMX" is to chloroxylenol [p-chloro-m-xyleneol; 4-chloro-3,5-dimethylxyleneol].

8. We hereby declare that all statements made by our own knowledge are true and all statements made on information and belief are believed to be true and further that statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment under § 100 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

Date 5/9/06

I. Raad  
Issam Raad

Date \_\_\_\_\_

\_\_\_\_\_  
Hend A. Hanna

Date \_\_\_\_\_

\_\_\_\_\_  
Nabeel Nabulsi

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agents in a single composition, and to coat the surface of medical devices (such as central venous catheters) with these compositions in an effort to inhibit the growth of microbacterial organisms that cause device-related infections. The date of this search was prior to September 25, 1998. Berberine, one of the agents that we searched in our review of the literature, is a yellow plant dye. Chlorhexidine, another of the agents search in the literature review, is a basic reagent.

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Date \_\_\_\_\_

\_\_\_\_\_  
Issam Raad

Date 5-8-06

Hend Hanna  
Hend A. Hanna

Date \_\_\_\_\_

\_\_\_\_\_  
Nabeel Nabulsi



**PATENT**

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*In re* Application of:

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NABULSI

Group Art Unit: 1744

Examiner: Chin, Brad Y.

Serial No.: 10/044,842

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Filed: January 11, 2002

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WITH BROAD SPECTRUM  
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agents in a single composition, and to coat the surface of medical devices (such as central venous catheters) with these compositions in an effort to inhibit the growth of microbacterial organisms that cause device-related infections. The date of this search was prior to September 25, 1998. Berberine, one of the agents that we searched in our review of the literature, is a yellow plant dye. Chlorhexidine, another of the agents search in the literature review, is a basic reagent.

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Date \_\_\_\_\_

\_\_\_\_\_  
Issam Raad

Date \_\_\_\_\_

\_\_\_\_\_  
Hend A. Hanna

Date 5/1/2006

  
\_\_\_\_\_  
Nabeel Nabulsi

# **EXHIBIT 1**

☐ Citation 4**Unique Identifier**

98125653

**Authors**McAuliffe O. Ryan MP. Ross RP. Hill C. Breeuwer P. Abee T.**Institution**

Department of Food Science, Wageningen Agricultural University, The Netherlands.

**Title**

Lacticin 3147, a broad-spectrum bacteriocin which selectively dissipates the membrane potential.

**Source**

Applied &amp; Environmental Microbiology. 64(2):439-45, 1998 Feb.

**Abbreviated Source**

Appl Environ Microbiol. 64(2):439-45, 1998 Feb.

**NLM Journal Code**

6k6

**Country of Publication**

United States

**MeSH Subject Headings**Adenosine Triphosphate / an [Analysis]Adenosine Triphosphate / me [Metabolism]\*Bacteria / de [Drug Effects]Bacteria / me [Metabolism]\*Bacteriocins / pd [Pharmacology]Membrane Potentials / de [Drug Effects]Potassium / me [Metabolism]**Abstract**

Lacticin 3147 is a broad-spectrum bacteriocin produced by *Lactococcus lactis* subsp. *lactis* DPC3147 (M. P. Ryan, M. C. Rea, C. Hill, and R. P. Ross, Appl. Environ. Microbiol. 62:612-619, 1996). Partial purification of the bacteriocin by hydrophobic interaction chromatography and reverse-phase fast protein liquid chromatography revealed that two components are required for full activity. Lacticin 3147 is bactericidal against *L. lactis*, *Listeria monocytogenes*, and *Bacillus subtilis*; at low concentrations of the bacteriocin, bactericidal activity is enhanced when target cells are energized. This finding suggests that the presence of a proton motive force promotes the interaction of the bacteriocin with the cytoplasmic membrane, leading to the formation of pores at these low lacticin 3147 concentrations. These pores were shown to be selective for K<sup>+</sup> ions and inorganic phosphate. The loss of these ions resulted in immediate dissipation of the membrane potential and hydrolysis of internal ATP, leading to an eventual collapse of the pH gradient at the membrane and ultimately to cell death. Our results suggest that lacticin 3147 is a pore-forming bacteriocin which acts on a broad range of gram-positive bacteria.

**Registry Numbers**

0 (Bacteriocins). 56-65-5 (Adenosine Triphosphate). 7440-09-7 (Potassium).

**ISSN**

0099-2240

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9804. Entry Week: 98044.



food additives handbook / Richard J. Lewis  
363.192 Lew.



☒ Citation 4**Unique Identifier**

97316528

**Authors**Davies EA. Bevis HE. Delves-Broughton J.**Institution**

Technical Services, Aplin &amp; Barrett Ltd, Beaminster, Dorset, UK.

**Title**The use of the bacteriocin, nisin, as a preservative in ricotta-type cheeses to control the food-borne pathogen *Listeria monocytogenes*.**Source**

Letters in Applied Microbiology. 24(5):343-6, 1997 May.

**Abbreviated Source**

Lett Appl Microbiol. 24(5):343-6, 1997 May.

**NLM Journal Code**

al0

**Country of Publication**

England

**MeSH Subject Headings**\*Bacteriocins / pd [Pharmacology]\*Cheese / mi [Microbiology]Cheese / po [Poisoning]Disease Outbreaks / pc [Prevention & Control]Evaluation StudiesFood Poisoning / ep [Epidemiology]Food Poisoning / pc [Prevention & Control]Food Preservation / mt [Methods]\*Food Preservatives / pd [Pharmacology]Human\*Listeria monocytogenes / de [Drug Effects]Listeria monocytogenes / gd [Growth & Development]Listeria monocytogenes / py [Pathogenicity]Listeria Infections / ep [Epidemiology]Listeria Infections / pc [Prevention & Control]\*Nisin / pd [Pharmacology]Time Factors**Abstract**

The efficacy of nisin to control the food-borne pathogen *Listeria monocytogenes* in ricotta-type cheeses over long storage (70 d) at 6-8 degrees C was determined. Cheeses were prepared from unpasteurized milk by direct acidification with acetic acid (final pH 5.9) and/or calcium chloride addition during heat treatment. Nisin was added in the commercial form of Nisaplin pre-production to the milk. Each batch of cheese was inoculated with 10(2)-10(3) cfu g-1 of a five-strain cocktail of *L. monocytogenes* before storage. Shelf-life analysis demonstrated that incorporation of nisin at a level of 2.5 mg l-1 could effectively inhibit the growth of *L. monocytogenes* for a period of 8 weeks or more (dependent on cheese type). Cheese made without the addition of nisin contained unsafe levels of the organism within 1-2 weeks of incubation. Measurement of initial and residual nisin

indicated a high level of retention over the 10-week incubation period at 6-8 degrees C, with only 10-32% nisin loss.

**Registry Numbers**

0 (Bacteriocins). 0 (Food Preservatives). 1414-45-5 (Nisin).

**ISSN**

0266-8254

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9709.



☒ Citation 22**Unique Identifier**

96055535

**Authors**Kulesz-Martin MF. Lisafeld B. Paterson J. Driscoll D. Shudo K. Roop DR. Kisiel ND.**Institution**Department of Experimental Therapeutics, Roswell Park Cancer Institute,  
Buffalo, NY 14263, USA.**Title**Differentiation and tumor response to retinobenzoic acid RE-80 in a malignant conversion model  
[published erratum appears in Cancer Detect Prev 1995;19(6):539].**Source**

Cancer Detection &amp; Prevention. 19(4):355-66, 1995.

**Abbreviated Source**

Cancer Detect Prev. 19(4):355-66, 1995.

**NLM Journal Code**

cnz

**Country of Publication**

United States

**MeSH Subject Headings**Animal\*Antineoplastic Agents / tu [Therapeutic Use]\*Benzoates / tu [Therapeutic Use]\*Carcinoma, Squamous Cell / dt [Drug Therapy]Carcinoma, Squamous Cell / pa [Pathology]Cell Differentiation / de [Drug Effects]Comparative StudyDisease Models, AnimalKeratin / de [Drug Effects]MiceMice, NudePapilloma / dt [Drug Therapy]Papilloma / pa [Pathology]\*Skin Neoplasms / dt [Drug Therapy]Skin Neoplasms / pa [Pathology]Support, Non-U.S. Gov'tSupport, U.S. Gov't, P.H.S\*Tetrahydronaphthalenes / tu [Therapeutic Use]Tumor Cells, Cultured**Abstract**

The synthetic retinobenzoic acid RE-80 was evaluated for its potential as an inducer of tumor cell differentiation and as a chemopreventive agent. A minimally toxic dose of RE-80 in vitro produced morphologic changes typical differentiation in epidermal tumor cell colonies. Indirect immunofluorescence indicated induction of a differentiation-associated keratin of internal stratified epithelia, K13, and inhibition of the differentiation-associated epidermal keratin K1. Cultured cells were skin-grafted to athymic nu/nu mice to evaluate RE-80 effects on early stage malignant

progression in vivo. When tumors had grown to 3 to 4 mm in diameter, mice were treated by intraperitoneal injection with RE-80 (67 micrograms, 170 mmol, i.p., two times per week) or vehicle (100 microliters 20% ethanol). Papillomas (benign) and moderately differentiated squamous cell carcinomas were reduced in volume about 4-fold by RE-80 treatment. Larger, poorly differentiated squamous cell carcinomas were unaffected. RE-80 resulted in a lower proportion of proliferative cells (detectable by bromodeoxyuridine incorporation) and a higher proportion of moderately to well differentiated tumors after 40 days of treatment compared with control tumors, which were mainly poorly differentiated squamous cell carcinomas. K13 induction in vitro was correlated with response to retinoid in vivo. Induction of differentiation may be mechanism of the response to RE-80 in vivo since carcinoma cells expressing K13 did not incorporate bromodeoxyuridine and were on a terminal pathway.

**Registry Numbers**

0 (Antineoplastic Agents). 0 (**Benzoates**). 0 (Tetrahydronaphthalenes). 116193-60-3 (Re 80). 68238-35-7 (Keratin).

**ISSN**

0361-090X

**Publication Type**

Journal Article.

**Language**

English

**Grant Numbers**

CA13038 (NCI), CA16056 (NCI)

**Entry Month**

9601 Revised: 970623.



**☑ Citation 25****Unique Identifier**

98012497

**Authors**Zani F. Minutello A. Maggi L. Santi P. Mazza P.**Institution**

Dipartimento Farmaceutico, Universita di Parma, Italy.

**Title**Evaluation of preservative effectiveness in pharmaceutical products: the use of a wild strain of *Pseudomonas cepacia*.**Source**

Journal of Applied Microbiology. 83(3):322-6, 1997 Sep.

**Abbreviated Source**

J Appl Microbiol. 83(3):322-6, 1997 Sep.

**NLM Journal Code**

ct3

**Country of Publication**

England

**MeSH Subject Headings**\*Benzoates / pd [Pharmacology]\*Burkholderia cepacia / de [Drug Effects]Burkholderia cepacia / gd [Growth & Development]Burkholderia cepacia / ip [Isolation & Purification]Drug EvaluationDrug Resistance, Microbial\*Parabens / pd [Pharmacology]\*Preservatives, Pharmaceutical / pd [Pharmacology]\*Sorbic Acid / pd [Pharmacology]Sorbitol / pd [Pharmacology]Sucralfate / pd [Pharmacology]Support, Non-U.S. Gov't**Abstract**

A sodium benzoate-sorbic acid preservative system of a pharmaceutical product was proved effective against a wild strain of *Pseudomonas cepacia*, following the official method of the Italian and British Pharmacopoeias. However, this preservative system was ineffective against a challenge of *Ps. cepacia* wild strain cells grown in the unpreserved pharmaceutical product and on culture media different from those described by the Pharmacopoeias. The adaptive resistance of the wild strain of *Ps. cepacia* was not demonstrated with a laboratory strain (ATCC 25609). In contrast, p-hydroxybenzoate-based preservative systems proved to be efficient in protecting the pharmaceutical product against a challenge of wild and laboratory strains of *Ps. cepacia* grown in the different conditions described above. The results obtained suggest the usefulness, in the official methods for testing pharmaceutical preservatives, of using wild microbial strains isolated from the pharmaceutical environment. Metabolic adaptive responses, capable of affecting the antimicrobial sensitivity of wild micro-organisms used to challenge the preserved product, can be detected by using cells grown in the unpreserved pharmaceutical product.

**Registry Numbers**

0 (**Benzoates**). 0 (Parabens). 0 (Preservatives, Pharmaceutical). 110-44-1 (Sorbic Acid). 50-70-4 (Sorbitol). 54182-58-0 (Sucralfate). 65-85-0 (benzoic acid). 99-96-7 (4-hydroxybenzoic acid).

**ISSN**

1364-5072

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9802.





Results of your search: \*Food preservatives/me,tu,to [Metabolism, Therapeutic Use, Toxicity]

Citations available: 6

Citations displayed: 1-6

### Citation 1

**Unique Identifier**

98128771

**Authors**

Serrano A. Palacios C. Roy G. Cespon C. Villar ML. Nocito M. Gonzalez-Parque P.

**Institution**

Department of Immunology, Hospital Ramon y Cajal, Madrid, Spain.

**Title**

Derivatives of gallic acid induce apoptosis in tumoral cell lines and inhibit lymphocyte proliferation.

**Source**

Archives of Biochemistry & Biophysics. 350(1):49-54, 1998 Feb 1.

**Abstract**

The effect of gallic acid (3,4,5-trihydroxybenzoic acid) and its alkyl esters (methyl, propyl, octyl, and lauryl) has been studied on several tumoral and nontumoral cells. Three types of behavior have been observed; the first type is represented by the mouse B cell lymphoma Wehi 231 cell line in which death occurs according to the biochemical characteristics of classical apoptosis showing the DNA ladder fragmentation pattern. The second type is represented by the mouse fibroblast L929 cell line in which morphological characteristics such as cell shrinkage, chromatin condensation, and appearance of apoptotic bodies can be evidenced by microscopical observation. However, the typical DNA fragmentation is absent. Peripheral blood lymphocytes are representative of a third type of behavior. In a resting state they can withstand higher concentrations of these compounds. If the drug is washed, they proliferate normally upon the addition of the mitogen phytohemagglutinin (PHA). However, if the drug is added in the presence of PHA, a clear antiproliferative effect can be demonstrated. A special interest for these compounds stems from the fact that some of them are currently used as antioxidant **food** additives with the European Community codes E-310 (propylgallate), E-311 (octylgallate), and E-312 (laurylgallate).

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### Citation 2

**Unique Identifier**

97480870

**Authors**

Ashby J. Lefevre PA. Odum J. Tinwell H. Kennedy SJ. Beresford N. Sumpter JP.

**Institution**

Zeneca Central Toxicology Laboratory, Macclesfield, Cheshire, United Kingdom.

**Title**

Failure to confirm estrogenic activity for benzoic acid and clofibrate: implications for lists of endocrine-disrupting agents.

**Source**

Regulatory Toxicology & Pharmacology. 26(1 Pt 1):96-101, 1997 Aug.

**Abstract**

Earlier reports that benzoic acid is uterotrophic to the rat and mouse and that clofibrate is uterotrophic to the rat have not been confirmed. The studies reported here involved the use of a range of test protocols and dose levels, including the protocols/dose levels used by the original investigators. In addition, both chemicals were inactive in a human estrogen receptor (hER alpha) yeast estrogenicity assay. It is concluded that benzoic acid and clofibrate are not estrogenic in the assays used here. This conclusion has implications for the compilation of lists of endocrine-disrupting chemicals.

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### Citation 3

**Unique Identifier**

98011295

**Authors**McFarlane M. Price SC. Cottrell S. Grasso P. Bremmer JN. Bomhard EM. Hinton RH.**Institution**

Robens Institute of Health and Safety, University of Surrey, Guildford, UK.

**Title**

Hepatic and associated response of rats to pregnancy, lactation and simultaneous treatment with butylated hydroxytoluene.

**Source****Food & Chemical Toxicology.** 35(8):753-67, 1997 Aug.**Abstract**

This paper describes changes in the livers of rats fed diets containing butylated hydroxytoluene (BHT) over two generations in two separate studies. BHT did not produce tumours when tested for carcinogenicity in several studies by the conventional way. However, when BHT was given to rats in a two-generation carcinogenicity study, a high incidence of hepatic tumours was found in males but not in female rats of the F1 generation. A sequential study has been carried out to gain an insight into this unexpected finding, paying particular attention to the perinatal period. In the dose-ranging study designed to assess the tolerance of rats to BHT, groups of male and female rats (F0 generation) were fed diets calculated to deliver 0, 500, 750 and 1000 mg/kg body weight/day. Following a loading period of 5 wk the rats were mated. The BHT content of the diet was not adjusted during pregnancy and lactation. Owing to the normal increase in food consumption during lactation, intakes peaked at double the nominal value by 21 days after the birth of pups. At this time the pups (F1) were weaned onto control diet and maintained on it for 4 wk. At birth, the body weights of pups from the BHT-treated dams were comparable to those of the controls but at weaning the body weights of the pups from all three dose levels were less than those of the controls. At the termination of the experiment (4 wk after weaning), the pups from BHT-treated dams still weighed less than those from untreated controls. In the main experiment the F0 generation were fed 0, 25, 100 and 500 mg/kg body weight/day. Their offspring (F1 generation) were weaned on diets containing the same amount of BHT as the respective parents, apart from the group given the highest dose level (500 mg/kg body weight/day). This dose level was reduced to 250 mg/kg body weight/day at weaning in order to conform with previously published findings. The pups from the dams given the highest dose level were maintained on a dietary concentration of 250 mg/kg body weight/day for the entire study. A group of age-matched non-pregnant females was also studied and the results obtained compared with those from pregnant dams. Pups from all groups were examined at day 20 of gestation, at weaning (21 days after birth), and at 4 and 22 wk post-weaning. There were no effects on fertility and no increase in foetal abnormalities at any dose of BHT. Dams receiving BHT at a nominal dose of 500 mg/kg body weight/day showed liver enlargement



accompanied by induction of pentoxeresorufin O-depentylase and glutathione S-transferase, and proliferation of the endoplasmic reticulum. Pups from these dams were of the same weight at birth as controls but lost weight during the lactation period. This deficit was not recovered by the time the experiment was terminated. Hence, in two independent studies, the only significant finding in rats treated with BHT in utero and during lactation was that the weight gain of pups during lactation was less than expected when dams received at least 500 mg BHT/kg body weight/day. The body weight of pups did not return to normal following a return to a control diet for 4 wk. It is postulated that the retardation in weight gain of the pups could be due to inadequate milk production.

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#### Citation 4

**Unique Identifier**

97351615

**Authors**Til HP. Kuper CF. Falke HE.**Institution**

TNO Nutrition and Food Research Institute, Zeist, The Netherlands.

**Title**

Nitrite-induced adrenal effects in rats and the consequences for the no-observed-effect level.

**Source**

Food &amp; Chemical Toxicology. 35(3-4):349-55, 1997 Mar-Apr.

**Abstract**

In a previous subchronic oral toxicity study with potassium nitrite, hypertrophy of the adrenal zona glomerulosa was observed for all nitrite levels examined including the lowest level of 100 mg/litre. This present study was carried out, therefore, to establish a no-observed-effect level (NOEL) for nitrite. Groups of 10 male and 10 female 6-wk-old Wistar rats received KNO<sub>2</sub> at levels of 12.5, 25, 50, 100 or 3000 mg/litre or NaNO<sub>2</sub> at levels of 81 or 2432 mg/litre in the drinking water for 13 wk. The nitrite content of the drinking water in the latter two groups was equal to that of the 100 and 3000 mg KNO<sub>2</sub>/litre groups, respectively. Potassium and sodium concentrations were equalized in the corresponding test groups with KCl and NaCl, respectively. General health, behaviour and survival were not affected by the ingestion of nitrite. Body weight and food and liquid intake were slightly decreased in the 3000 mg KNO<sub>2</sub>/litre and 2432 mg NaNO<sub>2</sub>/litre groups for both sexes. Methaemoglobin concentration was significantly elevated in rats of both high-dose nitrite groups in wk 4 and 12, while slight increases in a number of red blood cell variables occurred with 3000 mg KNO<sub>2</sub>/litre in females in wk 12. Relative kidney weights were increased in both high-dose nitrite groups. In wk 4, plasma aldosterone and corticosterone levels were slightly decreased in males with 2432 mg NaNO<sub>2</sub>/litre and plasma corticosterone in females with 3000 mg KNO<sub>2</sub>/litre but not in wk 13. Systolic blood pressure was not affected by nitrite. Microscopic examination revealed slight hypertrophy of the adrenal zona glomerulosa in animals of the 100 and 3000 mg KNO<sub>2</sub>/litre and of the 81 and 2432 mg NaNO<sub>2</sub>/litre groups, the incidence and degree being dose related. The results obtained with 100 and 3000 mg KNO<sub>2</sub>/litre in the drinking water were comparable with those found at the same levels in the previous 90-day study. The effects with sodium nitrite were similar to those observed with potassium nitrite. The biological significance of the adrenal zona glomerulosa hypertrophy is discussed. It is concluded that the NOEL of KNO<sub>2</sub> is 50 mg/litre in the drinking water, equivalent to about 5 mg/kg body weight/day.

## Citation 5

## Unique Identifier

97303804

## Authors

Sugihara N. Shimomichi K. Furuno K.

## Institution

Faculty of Pharmacy and Pharmaceutical Sciences, Fukuyama University,  
Hiroshima, Japan.

## Title

Cytotoxicity of **food preservatives** in cultured rat hepatocytes loaded with linolenic acid.

## Source

Toxicology. 120(1):29-36, 1997 Jun 6.

## Abstract

We investigated the ability of eight **food preservatives** to induce lipid peroxidation in normal and alpha-linolenic acid (LNA)-loaded cultured rat hepatocytes. On the addition of sodium dehydroacetate (DHA-Na), potassium sorbate (SA-K) or thiabendazole (TBZ) to the cell culture, lipid peroxidation, assessed in terms of the production of malondialdehyde (MDA), was induced in LNA-loaded cells, but not in normal cells. At the low concentrations, induction of lipid peroxidation in LNA-loaded cells was highest with TBZ, whereas at high concentrations DHA-Na greatly induced lipid peroxidation. The occurrence of lipid peroxidation in LNA-loaded cells was accompanied by a decrease in cellular GSH levels with the three **preservatives** and by a decrease in cellular protein-SH levels with DHA-Na and TBZ. Furthermore, cell injury, measured by the release of LDH, was produced in LNA-loaded cells exposed to DHA-Na and SA-K. The addition of TBZ caused substantial cell injury in normal cells, and even greater injury in LNA-loaded cells. The prevention of lipid peroxidation in LNA-loaded hepatocytes by addition of an antioxidant, N,N'-diphenyl-p-phenylenediamine (DPPD) almost completely prevented DHA-Na- and SA-K-induced cell injury, and reduced TBZ-induced cell injury. The addition of diphenyl (DP), o-phenylphenol (OPP) or butyl p-hydroxybenzoate (BHB) caused severe cell injury, in association with a marked decrease in cellular levels of both of GSH and protein-SH in both groups of cells. However, lipid peroxidation was not detectable in either group of cells exposed to these **preservatives**. Sodium propionate (PA-Na) and sodium benzoate (BA-Na) had little effect on any cytotoxic parameter in either group of cells.

## Citation 6

## Unique Identifier

97004976

## Authors

Kim HM. Han SB. Chang WI. Hyun BH. Oh GT. Ahn CJ. Cha YN.

## Institution

Korea Research Institute of Bioscience and Biotechnology, Taejon City.

## Title

Selective suppression of in vitro T-dependent humoral immunity by synthetic **food additive** antioxidants.

## Source

Journal of Toxicological Sciences. 21(1):41-5, 1996 Feb.

## Abstract

Effect of antioxidants on humoral immune responses, such as butylated hydroxytoluene (BHT), n-propyl gallate (PG) and dimethyl sulfoxide (DMSO) is suppression in vitro antibody production. These antioxidants all inhibited T-dependent B cell response, not T-independent and polyclonal B cell response. These data suggest that antioxidants suppress humoral immunity by suppression of regulation of T cells or action of macrophages on B cells, not by direct suppression of B cells. The other possible explanation for antioxidant action is the lack of T-B cell contact required for the triggering of the B cell response with T-dependent antigens.





Results of your search: \*Food preservatives/ae,pk,ch [Adverse Effects, Pharmacokinetics, Chemistry]

Citations available: 11

Citations displayed: 1-11

### Citation 1

**Unique Identifier**

98124688

**Authors**

Bollard M. Stribbling S. Mitchell S. Caldwell J.

**Institution**

Imperial College School of Medicine, London.

**Title**

The disposition of allyl isothiocyanate in the rat and mouse.

**Source**

Food & Chemical Toxicology. 35(10-11):933-43, 1997 Oct-Nov.

**Abstract**

The urine was the major route of excretion of radioactivity (50-80% of dose) following the oral administration (2.5 and 25 mg/kg body weight) of allyl[14C]isothiocyanate (AITC) to male and female Fischer 344 rats and B6C3F1 mice. Smaller amounts were found in the faeces (6-12%) and expired air (3-7%). The major difference between the two species was the greater retention of radioactivity after 4 days within rats (18-24% of dose) when compared with mice (2-5% of dose). Three radioactive components were found in the urine of mice and two in rats. The three components were inorganic thiocyanate, allylthiocarbamoylmercapturic acid and allylthiocarbamoylcysteine in mice, but no cysteine conjugate was found in rat urine. In the mouse, approximately 80% of the 14C was present in the urine as the thiocyanate ion whereas in the rat some 75% was as the mercapturate. This indicates that in the mouse, hydrolysis of AITC was the major metabolic pathway whereas in the rat glutathione conjugation was the major route. A species difference was seen in the amount of [14C]AITC-derived radioactivity present in the whole blood of rats and mice; measurable levels of radioactivity remained within rat blood for a longer time period (up to 240 hr) when compared with mice (96 hr). Examination of the urinary bladders of male and female rats following oral dosing with [14C]AITC showed a sex difference with greater amounts of [14C]AITC and/or its metabolites within the bladder tissue of male rats. This data is discussed in terms of the known species- and sex-specificity of the urinary bladder tumours, which occurred after long-term administration to male rats, but not to female rats or mice of either sex, in a carcinogenicity study conducted by the National Toxicology Program in the USA.

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### Citation 2

**Unique Identifier**

96386855

**Authors**

Schulte-Korne G. Deimel W. Gutenbrunner C. Hennighausen K. Blank R. Rieger C. Remschmidt H

**Institution**

Klinik und Poliklinik für Kinder- und Jugendpsychiatrie und Psychotherapie,  
Philipps-Universität Marburg.

**Title**

[Effect of an oligo-antigen diet on the behavior of hyperkinetic children]. [German]

**Source**

Z Kinder Jugendpsychiatr Psychother. 24(3):176-83, 1996 Sep.

**Abstract**

The influence of an oligoantigenic diet on different dimensions of the behavior of 21 children diagnosed as having attention-deficit hyperactivity disorder (ADHD) was examined. Treatment effects were assessed with three subjective measures (two questionnaires and an interview) and three objective measures (two attention tests and actometer). The study was divided into three phases: baseline, diet and provocation, each lasting three weeks. A crossover design was used. A significant effect was found for the subjective measures, but not for the objective measures. The results are discussed in terms of possible types of effects, e. g. rater effects and environmental effects. It may be that the oligoantigenic diet influences only certain dimensions of hyperactivity.

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**Citation 3****Unique Identifier**

98040945

**Authors**

Stebbing J.

**Title**

Post-prandial syncope due to nitrates in food [letter].

**Source**

Postgraduate Medical Journal. 73(863):606, 1997 Sep.

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**Citation 4****Unique Identifier**

97429419

**Authors**

Fisher AA.

**Title**

The sulfites: Part III. Facts about sulfites [news].

**Source**

Cutis. 60(2):73-4, 1997 Aug.

---

**Citation 5****Unique Identifier**

97239129

**Authors**

Petrus M. Bonaz S. Causse E. Micheau P. Rhabbour M. Netter JC. Bildstein G.

**Institution**

Service de Pédiatrie, Centre Hospitalier, Tarbes.

**Title**

[Clinico-immunological study of 16 cases of benzoate intolerance in children]. [French]

**Source**

Allergie et Immunologie. 29(2):36-8, 1997 Feb.

**Abstract**

The authors report a sery of 16 cases of intolerance to the benzoates in children. Sixteen children (9 boys and 7 girls) were directed to the Hospital of Tarbes from June 1995 to July 1995, for recurring urticaria (7/16) combined with asthma (1/16), atopic eczema (2/16), dermorespiratory syndrome (2/16) and asthma (1/16). All were subject to an immunological examination comprising alimentation inquiry, prick test, IgE determination, RAST, oral provocation test to benzoates, which establishes the diagnosis, whose confirmation is certified by the benefit of the **food** eviction. To conclusion, the authors underline several points: the presumable underestimation of the intolerance, the often mentioned atopic familial context, the observed pathology (urticaria, asthma, eczema), the importance of the provocation test. Finally, besides **food** such as grey shrimps, sodas and antibiotic syrups, one finds benzoates in the antiallergic syrups initially prescribed as a preventive measure.

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**Citation 6****Unique Identifier**

97052326

**Authors**

Munoz FJ. Bellido J. Moyano JC. Alvarez M. Fonseca JL.

**Institution**

Unidad de Alergia, Hospital Los Montalvos, Salamanca, Spain.

**Title**

Perioral contact urticaria from sodium benzoate in a toothpaste.

**Source**

Contact Dermatitis. 35(1):51, 1996 Jul.

---

**Citation 7****Unique Identifier**

96128767

**Authors**

Goburdhun D. Jhurree B.

**Institution**

Faculty of Agriculture, University of Mauritius, Reduit, Mauritius.

**Title**

Effect of deep-fat frying on fat oxidation in soybean oil.

**Source**

International Journal of Food Sciences & Nutrition. 46(4):363-71, 1995 Nov.

**Abstract**

The frying performance and stability of pure soybean oil (PSBO), soybean oil blended with palm kernel olein and PSBO with an antioxidant mixture of butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), propyl gallate and citric acid were compared. The oils were subjected to intermittent frying (up to 15 fryings, without any 'topping up') of potato slices, at 180 degrees C for a period of and 337 min. Analytical determinations on the oils included the peroxide value (PV),

iodine value (IV), free fatty acid (FFA) value, saponification value (SV) and the refractive index (RI). Changes in the product at the sensory level were also assessed. Results showed that (1) fat oxidation hence, reduction of unsaturated fatty acids, as indicated by changes in the IV, was non-significant in the treated oils, (2) hydrolysis of fats, as shown by changes in the FFA value from the first to last frying, was lowest in the blended oil but highest in PSBO, (3) the same trend as above was observed for PV, an indicator of fat oxidation and rancidity, (4) changes in SV were non-significant in the treated soya oils while PSBO with the antioxidant showed the least change in RI, (5) treated oils exhibited no visual increase in viscosity or turbidity and (6) PSBO with the antioxidant had the lightest colour at the end of the frying period. Taste panellists were unable to discriminate between products fried in the treated oils and in PSBO. Sensory assessment showed an improved quality of the chips fried in the blend. Chips fried in PSBO scored the lowest ratings. Thus, the overall results showed an improved behaviour and quality of the treated oils in terms of thermal stability during frying.

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### Citation 8

**Unique Identifier**

96161358

**Authors**

Van Hove JL. Kishnani P. Muenzer J. Wenstrup RJ. Summar ML. Brummond MR Lachiewicz AM. Millington DS. Kahler SG.

**Institution**

Department of Pediatrics, Duke University Medical Center, Durham, NC 27710, USA.

**Title**

Benzoate therapy and carnitine deficiency in non-ketotic hyperglycinemia.

**Source**

American Journal of Medical Genetics. 59(4):444-53, 1995 Dec 4.

**Abstract**

Five patients presenting with non-ketotic hyperglycinemia in the neonatal period were treated with sodium benzoate to normalize plasma glycine levels. This therapy resulted in seizure reduction and a marked increase in wakefulness. Plasma carnitine deficiency was noted in three of four patients tested, and benzoylcarnitine was identified in plasma, urine, and CSF. Treatment with L-carnitine normalized plasma free carnitine. L-carnitine showed a tendency to increase the glycine conjugation of benzoate. An episode of coma and increased seizures in one patient was associated with a toxic level of benzoate, probably due to insufficient mobilization of glycine for conjugation. High dose benzoate therapy improved the quality of life of surviving patients. Close monitoring of glycine, benzoate and carnitine levels is advised.

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### Citation 9

**Unique Identifier**

96114806

**Authors**

Baba S. Akira K. Suzuki H. Imachi M.

**Institution**

Tokyo College of Pharmacy, Japan.

**Title**

Use of nuclear magnetic resonance spectroscopy and selective C-labeling for pharmacokinetic research in man: detection of benzoic acid conversion to hippuric acid.

**Source**

Biological & Pharmaceutical Bulletin. 18(5):643-7, 1995 May.

**Abstract**

This paper demonstrates that the stable isotope tracer technique using NMR spectroscopy and the selective  $^{13}\text{C}$  labeling of protonated carbons can provide a relatively sensitive method to investigate pharmacokinetic problems in man. The urinary excreted  $[1,3,5\text{-}^{13}\text{C}_3]\text{hippuric acid } ([^{13}\text{C}]\text{HA})$  formed from orally administered  $[1,3,5\text{-}^{13}\text{C}_3]$  benzoic acid ( $[^{13}\text{C}]\text{BA}$ ) as a model substrate was successfully quantitated without any separation procedures by proton-decoupled  $^{13}\text{C}$ -NMR spectroscopy of 10-fold concentrated urine in a 10 min accumulation time. In spite of the low dosage (10mg BA), the C3,5 resonances of  $[^{13}\text{C}]\text{HA}$  were detected with favorable signal-to-noise ratios to quantitate  $[^{13}\text{C}]\text{HA}$  concentration. The administered  $[^{13}\text{C}]\text{BA}$  was found to be quantitatively biotransformed to HA and excreted in urine within 4h. The lower limit of detection was estimated to be 50 nmol in an NMR tube, which was improved about one order of magnitude over that of BA labeled in the quaternary carbon (C7). The potential of an inverse detection experiment using heteronuclear multiple quantum coherence was also investigated in order to detect  $[^{13}\text{C}]\text{HA}$  in urine, with a higher sensitivity. The inverse experiment improved the sensitivity by a factor of 2--3 over  $^{13}\text{C}:1\text{H}$ -NMR, although the specificity of detection was relatively poor.

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**Citation 10****Unique Identifier**

96048119

**Authors**

Gastaminza G. Quirce S. Torres M. Tabar A. Echechipia S. Munoz D. Fernandez de Corres L.

**Institution**

Servicio Alergologia, Hospital Santiago Apostol, Victoria-Gasteiz, Spain.

**Title**

Pickled onion-induced asthma: a model of sulfite-sensitive asthma? [see comments].

**Comments**

Comment in: Clin Exp Allergy 1995 Aug;25(8):680-1

**Source**

Clinical & Experimental Allergy. 25(8):698-703, 1995 Aug.

**Abstract**

**BACKGROUND:** Asthma elicited by sulfite ingestion has been mainly described in steroid-dependent and in non-atopic asthmatics. We have studied a group of 18 young extrinsic asthmatics who presented with asthma attacks immediately after eating pickled onions.

**OBJECTIVE:** The aim of this study is to ascertain if these asthma attacks are elicited by sulfites contained in pickled onions and the influence of the dose and pH of onions.

**METHODS:** The bronchial hyperreactivity of the patients was assessed by a methacholine challenge test. Oral challenge tests were performed with sodium metabisulfite (MSB) diluted in lemon juice at pH 4.2 and at pH 3.3 (only in patients who did not react with pH 4.2). Two types of pickled onions, Spanish and Dutch pickled onions, were used for oral challenge in seven of the patients. The Monier-Williams method was used to measure the  $\text{SO}_2$  concentration in pickled onions.

**RESULTS:** The oral provocation test with MBS, pH 4.2, elicited a positive response in six patients (33.3%) and the test at pH 3.3 was positive in three out of 12. No significant difference in PD20



values was found between these groups. Three of the seven patients challenged with Spanish pickled onions had a positive reaction but had no reaction with Dutch pickled onions. The SO<sub>2</sub> concentration in Spanish pickled onions varied between 765 and 1182 ppm while in Dutch pickled onions were 200 ppm; this exceeded the permitted level (100 ppm). SO<sub>2</sub> release in Spanish pickled onion samples was nearly 2.5 times higher when the pH of the sample decreased from 4.2 to 3.3.

**CONCLUSION:** High levels of SO<sub>2</sub> in Spanish pickled onions, and their low pH (3.3) would be the responsible factors of the asthmatic outbreaks after ingestion of Spanish pickled onions by these patients.

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### Citation 11

**Unique Identifier**

96048116

**Authors**Peroni DG. Boner AL.**Title**

Sulfite sensitivity [editorial; comment].

**Comments**

Comment on: Clin Exp Allergy 1995 Aug;25(8):698-703

**Source**

Clinical &amp; Experimental Allergy. 25(8):680-1, 1995 Aug.





Results of your search: **limit 1 to (human and english language and abstracts and yr=1996-1998)**

Citations available: 4

Citations displayed: 1-4

### Citation 1

**Unique Identifier**

98128771

**Authors**

Serrano A. Palacios C. Roy G. Cespon C. Villar ML. Nocito M. Gonzalez-Porque P.

**Institution**

Department of Immunology, Hospital Ramon y Cajal, Madrid, Spain.

**Title**

Derivatives of gallic acid induce apoptosis in tumoral cell lines and inhibit lymphocyte proliferation.

**Source**

Archives of Biochemistry & Biophysics. 350(1):49-54, 1998 Feb 1.

**Abstract**

The effect of gallic acid (3,4,5-trihydroxybenzoic acid) and its alkyl esters (methyl, propyl, octyl, and lauryl) has been studied on several tumoral and nontumoral cells. Three types of behavior have been observed; the first type is represented by the mouse B cell lymphoma Wehi 231 cell line in which death occurs according to the biochemical characteristics of classical apoptosis showing the DNA ladder fragmentation pattern. The second type is represented by the mouse fibroblast L929 cell line in which morphological characteristics such as cell shrinkage, chromatin condensation, and appearance of apoptotic bodies can be evidenced by microscopical observation. However, the typical DNA fragmentation is absent. Peripheral blood lymphocytes are representative of a third type of behavior. In a resting state they can withstand higher concentrations of these compounds. If the drug is washed, they proliferate normally upon the addition of the mitogen phytohemagglutinin (PHA). However, if the drug is added in the presence of PHA, a clear antiproliferative effect can be demonstrated. A special interest for these compounds stems from the fact that some of them are currently used as antioxidant **food** additives with the European Community codes E-310 (propylgallate), E-311 (octylgallate), and E-312 (laurylgallate).

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### Citation 2

**Unique Identifier**

97480870

**Authors**

Ashby J. Lefevre PA. Odum J. Tinwell H. Kennedy SJ. Beresford N. Sumpter JP.

**Institution**

Zeneca Central Toxicology Laboratory, Macclesfield, Cheshire, United Kingdom.

**Title**

Failure to confirm estrogenic activity for benzoic acid and clofibrate: implications for lists of endocrine-disrupting agents.

**Source**

Regulatory Toxicology & Pharmacology. 26(1 Pt 1):96-101, 1997 Aug.

**Abstract**

Earlier reports that benzoic acid is uterotrophic to the rat and mouse and that clofibrate is uterotrophic to the rat have not been confirmed. The studies reported here involved the use of a range of test protocols and dose levels, including the protocols/dose levels used by the original investigators. In addition, both chemicals were inactive in a human estrogen receptor (hER alpha) yeast estrogenicity assay. It is concluded that benzoic acid and clofibrate are not estrogenic in the assays used here. This conclusion has implications for the compilation of lists of endocrine-disrupting chemicals.

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### Citation 3

**Unique Identifier**

97316528

**Authors**Davies EA. Bevis HE. Delves-Broughton J.**Institution**

Technical Services, Aplin &amp; Barrett Ltd, Beaminster, Dorset, UK.

**Title**

The use of the bacteriocin, nisin, as a preservative in ricotta-type cheeses to control the **food**-borne pathogen *Listeria monocytogenes*.

**Source**

Letters in Applied Microbiology. 24(5):343-6, 1997 May.

**Abstract**

The efficacy of nisin to control the **food**-borne pathogen *Listeria monocytogenes* in ricotta-type cheeses over long storage (70 d) at 6-8 degrees C was determined. Cheeses were prepared from unpasteurized milk by direct acidification with acetic acid (final pH 5.9) and/or calcium chloride addition during heat treatment. Nisin was added in the commercial form of Nisaplin pre-production to the milk. Each batch of cheese was inoculated with 10(2)-10(3) cfu g-1 of a five-strain cocktail of *L. monocytogenes* before storage. Shelf-life analysis demonstrated that incorporation of nisin at a level of 2.5 mg l-1 could effectively inhibit the growth of *L. monocytogenes* for a period of 8 weeks or more (dependent on cheese type). Cheese made without the addition of nisin contained unsafe levels of the organism within 1-2 weeks of incubation. Measurement of initial and residual nisin indicated a high level of retention over the 10-week incubation period at 6-8 degrees C, with only 10-32% nisin loss.

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### Citation 4

**Unique Identifier**

96372156

**Authors**Delves-Broughton J. Blackburn P. Evans RJ. Hugenholtz J.**Institution**

Aplin &amp; Barrett Ltd. and Applied Microbiology Inc., Dorset, UK.

**Title**

Applications of the bacteriocin, nisin. [Review] [67 refs]

**Source**

Antonie van Leeuwenhoek. 69(2):193-202, 1996 Feb.

**Abstract**

Nisin was first introduced commercially as a **food** preservative in the UK approximately 30 years ago. First established use was as a preservative in processed cheese products and since then numerous other applications in **foods** and beverages have been identified. It is currently recognised as a safe **food** preservative in approximately 50 countries. The established uses of nisin as a preservative in processed cheese, various pasteurised dairy products, and canned vegetables will be briefly reviewed. More recent applications of nisin include its use as a preservative in high moisture, hot baked flour products (crumpets) and pasteurised liquid egg. Renewed interest is evident in the use of nisin in natural cheese production. Considerable research has been carried out on the antilisterial properties of nisin in **foods** and a number of applications have been proposed. Uses of nisin to control spoilage lactic acid bacteria have been identified in beer, wine, alcohol production and low pH **foods** such as salad dressings. Further developments of nisin are likely to include synergistic action of nisin with chelators and other bacteriocins, and its use as an adjunct in novel **food** processing technology such as higher pressure sterilisation and electroporation. Production of highly purified nisin preparations and enhancement by chelators has led to interest in the use of nisin for human ulcer therapy, and mastitis control in cattle. [References: 67]





## □ Citation 4

**Unique Identifier**

98012507

**Authors**Scannell AG. Hill C. Buckley DJ. Arendt EK.**Institution**Department of Food Technology, University College Cork,  
Ireland.**Title**

Determination of the influence of organic acids and nisin on shelf-life and microbiological safety aspects of fresh pork sausage.

**Source**

Journal of Applied Microbiology. 83(4):407-12, 1997 Oct.

**Abbreviated Source**

J Appl Microbiol. 83(4):407-12, 1997 Oct.

**NLM Journal Code**

ct3

**Country of Publication**

England

**MeSH Subject Headings**Animal\*Citrates / pd [Pharmacology]Consumer Product Safety\*Food Preservatives / pd [Pharmacology]\*Meat Products / mi [Microbiology]\*Nisin / pd [Pharmacology]\*Salmonella / de [Drug Effects]Salmonella / gd [Growth & Development]\*Sodium Lactate / pd [Pharmacology]\*Staphylococcus aureus / de [Drug Effects]Staphylococcus aureus / ge [Genetics]Sulfur Dioxide / pd [Pharmacology]Support, Non-U.S. Gov'tSwine**Abstract**

The effect of replacing sulphur dioxide with organic acids and nisin to reduce the microbial counts in fresh pork sausage was examined. The potential of sodium citrate or sodium lactate, used singly or in combination with nisin, was also assessed in sausage inoculated with *Staphylococcus aureus* MMPR 3 and *Salmonella kentucky* AT 1. The results indicate that a combination of sodium lactate and nisin was particularly effective in reducing total bacterial counts in this food product. It also appears that this combination provides an increased protection against common pathogenic contaminants of fresh pork sausage, i.e. *Staph. aureus* and *Salmonella* species.

**Registry Numbers**

0 (Citrates). 0 (Food Preservatives). 1414-45-5 (Nisin). 18996-35-5 (sodium citrate). 72-17-3 (Sodium Lactate). 7446-09-5 (Sulfur Dioxide).

**ISSN**

1364-5072

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9804. Entry Week: 98042.



☒ Citation 5**Unique Identifier**

98007589

**Authors**Leyva JS. Manrique M. Peinado JM.**Institution**Departamento de Microbiologia III, Facultad de Biologia, Universidad  
Complutense de Madrid, Spain.**Title**Benzoate effect on a benzoate-resistant strain of *Zygosaccharomyces bailii*.**Source**

Folia Microbiologica. 42(3):236-8, 1997.

**Abbreviated Source**

Folia Microbiol (Praha). 42(3):236-8, 1997.

**NLM Journal Code**

f23

**Country of Publication**

Czech Republic

**MeSH Subject Headings**

\*Benzoates / pd [Pharmacology]  
Carbohydrates / me [Metabolism]  
Citrate (si)-Synthase / an [Analysis]  
Comparative Study  
Dose-Response Relationship, Drug  
Drug Resistance, Microbial  
\*Endomycetales / de [Drug Effects]  
Endomycetales / me [Metabolism]  
\*Food Preservatives / pd [Pharmacology]  
Oxidation-Reduction / de [Drug Effects]  
Saccharomyces cerevisiae / de [Drug Effects]  
Saccharomyces cerevisiae / me [Metabolism]  
Support, Non-U.S. Gov't

**Registry Numbers**EC 4-1-3-7 (Citrate (si)-Synthase). 0 (Benzoates). 0 (Carbohydrates). 0 (**Food Preservatives**).  
65-85-0 (benzoic acid).**ISSN**

0015-5632

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9801 Revised: 971229. Entry Week: 98035.







**☒ Citation 9****Unique Identifier**

97480870

**Authors**Ashby J. Lefevre PA. Odum J. Tinwell H. Kennedy SJ. Beresford N. Sumpter JP.**Institution**

Zeneca Central Toxicology Laboratory, Macclesfield, Cheshire, United Kingdom.

**Title**

Failure to confirm estrogenic activity for benzoic acid and clofibrate: implications for lists of endocrine-disrupting agents.

**Source**

Regulatory Toxicology &amp; Pharmacology. 26(1 Pt 1):96-101, 1997 Aug.

**Abbreviated Source**

Regul Toxicol Pharmacol. 26(1 Pt 1):96-101, 1997 Aug.

**NLM Journal Code**

rbh

**Country of Publication**

United States

**MeSH Subject Headings**Animal\*Antilipemic Agents / to [Toxicity]\*Benzoates / to [Toxicity]\*Clofibrate / to [Toxicity]Drug Combinations\*Estrogens / to [Toxicity]Female\*Food Preservatives / to [Toxicity]HumanOrgan Weight / de [Drug Effects]RatsReceptors, Estrogen / de [Drug Effects]Receptors, Estrogen / me [Metabolism]\*Uterine Diseases / ci [Chemically Induced]Uterine Diseases / pa [Pathology]\*Uterus / de [Drug Effects]Uterus / pa [Pathology]**Abstract**

Earlier reports that benzoic acid is uterotrophic to the rat and mouse and that clofibrate is uterotrophic to the rat have not been confirmed. The studies reported here involved the use of a range of test protocols and dose levels, including the protocols/dose levels used by the original investigators. In addition, both chemicals were inactive in a human estrogen receptor (hER alpha) yeast estrogenicity assay. It is concluded that benzoic acid and clofibrate are not estrogenic in the assays used here. This conclusion has implications for the compilation of lists of endocrine-disrupting chemicals.

**Registry Numbers**

0 (Antilipemic Agents). 0 (Benzoates). 0 (Drug Combinations). 0 (Estrogens). 0 (Food

**Preservatives).** 0 (Receptors, Estrogen). 637-07-0 (Clofibrate). 65-85-0 (benzoic acid).

**ISSN**

0273-2300

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9801:



☒ Citation 10**Unique Identifier**

98011295

**Authors**McFarlane M. Price SC. Cottrell S. Grasso P. Bremmer JN. Bomhard EM. Hinton RH.**Institution**

Robens Institute of Health and Safety, University of Surrey, Guildford, UK.

**Title**

Hepatic and associated response of rats to pregnancy, lactation and simultaneous treatment with butylated hydroxytoluene.

**Source**

Food &amp; Chemical Toxicology. 35(8):753-67, 1997 Aug.

**Abbreviated Source**

Food Chem Toxicol. 35(8):753-67, 1997 Aug.

**NLM Journal Code**

f3u

**Journal Subset**

C

**Country of Publication**

England

**MeSH Subject Headings**AnimalBody Weight / de [Drug Effects]\*Butylated Hydroxytoluene / to [Toxicity]Cytochrome P-450 / bi [Biosynthesis]Cytochrome P-450 / de [Drug Effects]Eating / de [Drug Effects]Female\*Fetal Development / de [Drug Effects]Fetus / en [Enzymology]\*Food Preservatives / to [Toxicity]\*Lactation / de [Drug Effects]\*Liver / de [Drug Effects]Liver / en [Enzymology]Liver / pa [Pathology]Liver / ul [Ultrastructure]MaleMicrosomes, Liver / de [Drug Effects]Microsomes, Liver / en [Enzymology]Organ Weight / de [Drug Effects]PregnancyRatsRats, Wistar\*Reproduction / de [Drug Effects]Support, Non-U.S. Gov'tZona Fasciculata / de [Drug Effects]

Zona Fasciculata / pa [Pathology]**Abstract**

This paper describes changes in the livers of rats fed diets containing butylated hydroxytoluene (BHT) over two generations in two separate studies. BHT did not produce tumours when tested for carcinogenicity in several studies by the conventional way. However, when BHT was given to rats in a two-generation carcinogenicity study, a high incidence of hepatic tumours was found in males but not in female rats of the F1 generation. A sequential study has been carried out to gain an insight into this unexpected finding, paying particular attention to the perinatal period. In the dose-ranging study designed to assess the tolerance of rats to BHT, groups of male and female rats (F0 generation) were fed diets calculated to deliver 0, 500, 750 and 1000 mg/kg body weight/day. Following a loading period of 5 wk the rats were mated. The BHT content of the diet was not adjusted during pregnancy and lactation. Owing to the normal increase in food consumption during lactation, intakes peaked at double the nominal value by 21 days after the birth of pups. At this time the pups (F1) were weaned onto control diet and maintained on it for 4 wk. At birth, the body weights of pups from the BHT-treated dams were comparable to those of the controls but at weaning the body weights of the pups from all three dose levels were less than those of the controls. At the termination of the experiment (4 wk after weaning), the pups from BHT-treated dams still weighed less than those from untreated controls. In the main experiment the F0 generation were fed 0, 25, 100 and 500 mg/kg body weight/day. Their offspring (F1 generation) were weaned on diets containing the same amount of BHT as the respective parents, apart from the group given the highest dose level (500 mg/kg body weight/day). This dose level was reduced to 250 mg/kg body weight/day at weaning in order to conform with previously published findings. The pups from the dams given the highest dose level were maintained on a dietary concentration of 250 mg/kg body weight/day for the entire study. A group of age-matched non-pregnant females was also studied and the results obtained compared with those from pregnant dams. Pups from all groups were examined at day 20 of gestation, at weaning (21 days after birth), and at 4 and 22 wk post-weaning. There were no effects on fertility and no increase in foetal abnormalities at any dose of BHT. Dams receiving BHT at a nominal dose of 500 mg/kg body weight/day showed liver enlargement accompanied by induction of pentoxylresorufin O-depentylase and glutathione S-transferase, and proliferation of the endoplasmic reticulum. Pups from these dams were of the same weight at birth as controls but lost weight during the lactation period. This deficit was not recovered by the time the experiment was terminated. Hence, in two independent studies, the only significant finding in rats treated with BHT in utero and during lactation was that the weight gain of pups during lactation was less than expected when dams received at least 500 mg BHT/kg body weight/day. The body weight of pups did not return to normal following a return to a control diet for 4 wk. It is postulated that the retardation in weight gain of the pups could be due to inadequate milk production.

**Registry Numbers**

0 (Food Preservatives). 128-37-0 (Butylated Hydroxytoluene). 9035-51-2 (Cytochrome P-450).

**ISSN**

0278-6915

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9801.





☒ Citation 11**Unique Identifier**

97429419

**Authors**Fisher AA**Title**

The sulfites: Part III. Facts about sulfites [news].

**Source**

Cutis. 60(2):73-4, 1997 Aug.

**Abbreviated Source**

Cutis. 60(2):73-4, 1997 Aug.

**NLM Journal Code**

dxh

**Country of Publication**

United States

**MeSH Subject Headings**\*Food Preservatives / ae [Adverse Effects]Human\*Preservatives, Pharmaceutical / ae [Adverse Effects]\*Sulfites / ae [Adverse Effects]United StatesUnited States Food and Drug Administration**Registry Numbers**

0 (Food Preservatives). 0 (Preservatives, Pharmaceutical). 0 (Sulfites).

**ISSN**

0011-4162

**Publication Type**

News.

**Language**

English

**Entry Month**

9801.



☒ Citation 12**Unique Identifier**

97235572

**Authors**Wan J. Gordon JB. Muirhead K. Hickey MW. Coventry MJ.**Institution**Australian Food Industry Science Centre, Werribee, Victoria,  
Australia.**Title**

Incorporation of nisin in micro-particles of calcium alginate.

**Source**

Letters in Applied Microbiology. 24(3):153-8, 1997 Mar.

**Abbreviated Source**

Lett Appl Microbiol. 24(3):153-8, 1997 Mar.

**NLM Journal Code**

al0

**Country of Publication**

England

**MeSH Subject Headings**\*Alginates / cs [Chemical Synthesis]Alginates / me [Metabolism]Alginates / ul [Ultrastructure]AnimalBiological AssayChymotrypsin / pd [Pharmacology]Culture Media / me [Metabolism]Drug Compounding / mt [Methods]\*Food Preservatives / cs [Chemical  
Synthesis]Food Preservatives / me [Metabolism]Food Preservatives / pd [Pharmacology]Lactobacillus / de [Drug Effects]Lactobacillus / gd [Growth & Development]Microscopy, Electron, ScanningMilk / me [Metabolism]\*Nisin / cs [Chemical Synthesis]Nisin / me [Metabolism]Nisin / pd [Pharmacology]Peptide Peptidohydrolases / pd [Pharmacology]Support, Non-U.S. Gov't**Abstract**

Nisin was successfully incorporated into a matrix of calcium alginate and ground into micro-particles smaller than 150 microns. Formation of micro-particles and incorporation of nisin was verified by scanning electron microscopy and by the reduction in the inactivation of nisin activity with proteolytic enzymes. Incorporation efficiency was 87-93% and the nisin in the alginate-incorporated form was 100% active against an indicator culture of *Lactobacillus curvatus* both in MRS broth and

reconstituted skim milk.

**Registry Numbers**

EC 3-4 (Peptide Peptidohydrolases). EC 3-4-21-1 (Chymotrypsin). 0 (Alginates). 0 (Culture Media). 0 (**Food Preservatives**). 1414-45-5 (Nisin).

**ISSN**

0266-8254

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9707.





☒ Citation 13**Unique Identifier**

97419496

**Authors**Thomas LV. Wimpenny JW. Barker GC.**Institution**School of Pure and Applied Biology, University of Wales Cardiff, UK.  
sablvt:cf.ac.uk**Title**Spatial interactions between subsurface bacterial colonies in a model system: a territory model describing the inhibition of *Listeria monocytogenes* by a nisin-producing lactic acid bacterium.**Source**

Microbiology. 143 ( Pt 8):2575-82, 1997 Aug.

**Abbreviated Source**

Microbiology. 143 ( Pt 8):2575-82, 1997 Aug.

**NLM Journal Code**

bxw

**Country of Publication**

England

**MeSH Subject Headings**AntibiosisFood Microbiology\*Food Preservatives / pd [Pharmacology]\*Lactococcus lactis / me [Metabolism]\*Listeria monocytogenes / de [Drug Effects]Microbiological Techniques\*Models, Biological\*Nisin / pd [Pharmacology]Support, Non-U.S. Gov't**Abstract**

The effect of spatial separation on interactions between subsurface bacterial colonies was tested using a model system: the inhibition of *Listeria monocytogenes* by nisin-producing and nisin-non-producing *Lactococcus lactis* subsp. *lactis*. Separation distance was controlled by altering the number of inoculum organisms within the agar. Mean separation distance was calculated by determining the mean volume available to each cell at the start of the experiment. Inhibition was assessed by comparing the growth of *L. monocytogenes* in pure culture with its growth in the presence of *Lac. lactis* subsp. *lactis*. Increasing the distance between colonies resulted in an exponential decrease in inhibition. When *L. monocytogenes* and *Lac. lactis* subsp. *lactis* colonies were within 100 microns of each other, the increase in cell numbers per *L. monocytogenes* colony was only 0.6 c.f.u. (which indicated some cells had become non-viable). This was a log reduction of 3.5 compared to the pure culture control. A separation distance of 1000 microns resulted in a *L. monocytogenes* colony growth increment of  $2.5 \times 10(2)$  c.f.u. per colony, a log reduction of 3.0 compared to the control. Increasing the separation distance to 3000 microns resulted in a *L. monocytogenes* colony growth increment of  $1.3 \times 10(6)$  c.f.u. per colony, a log reduction of 0.9 compared to the control. The effects of nisin and acidity were investigated by using a nisin-non-producing strain of *Lac. lactis* subsp. *lactis* and by buffering the medium. Data were

obtained for the effect of separation on inhibition, as well as competition between colonies of the same species. The inhibition was mathematically described in terms of a simplified 'territory' model of immobilized bacterial growth. There was a strong qualitative agreement between the mathematical model and the experimental data. It was concluded that the phenomenon of propinquity is of important consideration when modeling and predicting microbial growth within solid food systems.

**Registry Numbers**

0 (Food Preservatives). 1414-45-5 (Nisin).

**ISSN**

1350-0872

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9712.



☒ Citation 14**Unique Identifier**

97325574

**Authors**Rozum JJ. Maurer AJ.**Institution**Department of Animal Sciences, University of Wisconsin, Madison 53706-1284,  
USA.**Title**

Microbiological quality of cooked chicken breasts containing commercially available shelf-life extenders.

**Source**

Poultry Science. 76(6):908-13, 1997 Jun.

**Abbreviated Source**

Poult Sci. 76(6):908-13, 1997 Jun.

**NLM Journal Code**

pg3

**Country of Publication**

United States

**MeSH Subject Headings**Analysis of VarianceAnimalBacteria, Aerobic / ip [Isolation & Purification]ChickensColony Count, Microbial\*Food Microbiology / st [Standards]Food Preservation / mt [Methods]\*Food Preservation / st [Standards]\*Food Preservatives / ad [Administration &Dosage]Meat / mi [Microbiology]\*Meat / st [Standards]**Abstract**

Experiments were conducted to determine the effect of various shelf-life extenders on the aerobic plate counts (APC) of cooked chicken breast meat stored at refrigeration temperatures. Fresh chicken breast meat obtained from local grocers was injected with either 0.5, 1, 1.5, or 2% sodium lactate; 0.63, 1.25, 1.88, or 2.51 g/kg of a liquid smoke flavoring; 0.33, 0.66, 1, or 1.33% Per/Lac 1901, a fermented whey product; or 0.25, 0.5, 0.75, or 1% Alta 2341, a fermented corn syrup product. The samples were cooked at 85 C dry bulb, 77.8 C wet bulb to an internal temperature of 76.7 C. The cooked chicken breasts were cut into 20-g samples and aseptically placed into Ziploc bags. Initial APC were enumerated following 2-d incubation at 30 C. Additional stored samples (2 C) were subsequently evaluated for APC every week for 5 wk. Only one of the four ingredients, Alta 2341, significantly extended cooked breast meat shelf-life over that of the controls. Using Alta 2341 would be beneficial in extending the refrigerated shelf-life of cooked chicken breast meat up to 5 wk.

**Registry Numbers**

0 (Food Preservatives).

**ISSN**

0032-5791

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9710.



☒ Citation 16**Unique Identifier**

97368406

**Authors**Vleeming W. van de Kuil A. te Biesebeek JD. Meulenbelt J. Boink AB.**Institution**

RIVM National Institute of Public Health and Environment, Laboratory of Effects Research, Bilthoven, The Netherlands.

**Title**

Effect of nitrite on blood pressure in anaesthetized and free-moving rats.

**Source**

Food &amp; Chemical Toxicology. 35(6):615-9, 1997 Jun.

**Abbreviated Source**

Food Chem Toxicol. 35(6):615-9, 1997 Jun.

**NLM Journal Code**

f3u

**Journal Subset**

C

**Country of Publication**

England

**MeSH Subject Headings**Anesthesia, GeneralAnimal\*Blood Pressure / de [Drug Effects]Comparative StudyDose-Response Relationship, Drug\*Food Preservatives / pd [Pharmacology]Heart Rate / de [Drug Effects]Male\*Movement / ph [Physiology]Nitrates / bl [Blood]Nitrites / bl [Blood]Nitrites / pd [Pharmacology]RatsRats, Wistar\*Sodium Nitrite / pd [Pharmacology]Wakefulness**Abstract**

The effect of nitrite on blood pressure and heart rate was studied in anaesthetized (non-telemetric method) and free-moving rats (biotelemetry system). In anaesthetized rats, NaNO<sub>2</sub> (10-1000 µmol/kg), infused over 5 min, induced a dose-related decrease in blood pressure. The maximal decrease in mean arterial blood pressure (MAP), caused by 1000 µmol/kg NaNO<sub>2</sub> and measured 15 min after infusion was 55.9 ± 3.2% (n = 3). After NaNO<sub>2</sub> infusion, in the plasma, rapid conversion of nitrite into nitrate was observed. However, sodium nitrate (NaNO<sub>3</sub>, 100 µmol/kg) did not decrease blood pressure and there was no conversion of nitrate into nitrite. Free-moving rats received KNO<sub>2</sub> which was added to drinking water (36 mmol/litre) for a period of 3 days. KNO<sub>2</sub>

decreased the MAP and increased the heart rate during the rat's activity phase at night but not during their resting phase in the day. An equal concentration of potassium (KCl, 36 mmol/litre added to drinking water) for 3 days did not decrease blood pressure. It is concluded that nitrite decreases blood pressure in rats, which probably induces, by renin-angiotensin system activation, hypertrophy of the adrenal zona glomerulosa.

**Registry Numbers**

0 (Food Preservatives). 0 (Nitrates). 0 (Nitrites). 7632-00-0 (Sodium Nitrite). 7758-09-0 (potassium nitrite).

**ISSN**

0278-6915

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9710.



☒ Citation 17**Unique Identifier**

97351615

**Authors**Til HP. Kuper CF. Falke HE.**Institution**

TNO Nutrition and Food Research Institute, Zeist, The Netherlands.

**Title**

Nitrite-induced adrenal effects in rats and the consequences for the no-observed-effect level.

**Source**

Food &amp; Chemical Toxicology. 35(3-4):349-55, 1997 Mar-Apr.

**Abbreviated Source**

Food Chem Toxicol. 35(3-4):349-55, 1997 Mar-Apr.

**NLM Journal Code**

f3u

**Journal Subset**

C

**Country of Publication**

England

**MeSH Subject Headings**Administration, OralAnimalBody Weight / de [Drug Effects]Eating / de [Drug Effects]Female\*Food Preservatives / to [Toxicity]Hypertrophy / pa [Pathology]Kidney / de [Drug Effects]Kidney / pa [Pathology]Male\*Nitrites / to [Toxicity]No-Observed-Adverse-Effect LevelRatsRats, Wistar\*Sodium Nitrite / to [Toxicity]\*Zona Glomerulosa / de [Drug Effects]Zona Glomerulosa / pa [Pathology]**Abstract**

In a previous subchronic oral toxicity study with potassium nitrite, hypertrophy of the adrenal zona glomerulosa was observed for all nitrite levels examined including the lowest level of 100 mg/litre. This present study was carried out, therefore, to establish a no-observed-effect level (NOEL) for nitrite. Groups of 10 male and 10 female 6-wk-old Wistar rats received KNO<sub>2</sub> at levels of 12.5, 25, 50, 100 or 3000 mg/litre or NaNO<sub>2</sub> at levels of 81 or 2432 mg/litre in the drinking water for 13 wk. The nitrite content of the drinking water in the latter two groups was equal to that of the 100 and 3000 mg KNO<sub>2</sub>/litre groups, respectively. Potassium and sodium concentrations were equalized in

the corresponding test groups with KCl and NaCl, respectively. General health, behaviour and survival were not affected by the ingestion of nitrite. Body weight and food and liquid intake were slightly decreased in the 3000 mg KNO<sub>2</sub>/litre and 2432 mg NaNO<sub>2</sub>/litre groups for both sexes. Methaemoglobin concentration was significantly elevated in rats of both high-dose nitrite groups in wk 4 and 12, while slight increases in a number of red blood cell variables occurred with 3000 mg KNO<sub>2</sub>/litre in females in wk 12. Relative kidney weights were increased in both high-dose nitrite groups. In wk 4, plasma aldosterone and corticosterone levels were slightly decreased in males with 2432 mg NaNO<sub>2</sub>/litre and plasma corticosterone in females with 3000 mg KNO<sub>2</sub>/litre but not in wk 13. Systolic blood pressure was not affected by nitrite. Microscopic examination revealed slight hypertrophy of the adrenal zona glomerulosa in animals of the 100 and 3000 mg KNO<sub>2</sub>/litre and of the 81 and 2432 mg NaNO<sub>2</sub>/litre groups, the incidence and degree being dose related. The results obtained with 100 and 3000 mg KNO<sub>2</sub>/litre in the drinking water were comparable with those found at the same levels in the previous 90-day study. The effects with sodium nitrite were similar to those observed with potassium nitrite. The biological significance of the adrenal zona glomerulosa hypertrophy is discussed. It is concluded that the NOEL of KNO<sub>2</sub> is 50 mg/litre in the drinking water, equivalent to about 5 mg/kg body weight/day.

**Registry Numbers**

0 (Food Preservatives). 0 (Nitrites). 7632-00-0 (Sodium Nitrite). 7758-09-0 (potassium nitrite).

**ISSN**

0278-6915

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9709.





☒ Citation 18**Unique Identifier**

97316528

**Authors**Davies EA. Bevis HE. Delves-Broughton J.**Institution**

Technical Services, Aplin &amp; Barrett Ltd, Beaminster, Dorset, UK.

**Title**The use of the bacteriocin, nisin, as a preservative in ricotta-type cheeses to control the **food-borne** pathogen *Listeria monocytogenes*.**Source**

Letters in Applied Microbiology. 24(5):343-6, 1997 May.

**Abbreviated Source**

Lett Appl Microbiol. 24(5):343-6, 1997 May.

**NLM Journal Code**

al0

**Country of Publication**

England

**MeSH Subject Headings**\*Bacteriocins / pd [Pharmacology]\*Cheese / mi [Microbiology]Cheese / po [Poisoning]Disease Outbreaks / pc [Prevention & Control]Evaluation StudiesFood Poisoning / ep [Epidemiology]Food Poisoning / pc [Prevention & Control]Food Preservation / mt [Methods]\*Food Preservatives / pd [Pharmacology]Human\*Listeria monocytogenes / de [Drug Effects]Listeria monocytogenes / gd [Growth & Development]Listeria monocytogenes / py [Pathogenicity]Listeria Infections / ep [Epidemiology]Listeria Infections / pc [Prevention & Control]\*Nisin / pd [Pharmacology]Time Factors**Abstract**

The efficacy of nisin to control the **food-borne** pathogen *Listeria monocytogenes* in ricotta-type cheeses over long storage (70 d) at 6-8 degrees C was determined. Cheeses were prepared from unpasteurized milk by direct acidification with acetic acid (final pH 5.9) and/or calcium chloride addition during heat treatment. Nisin was added in the commercial form of Nisaplin pre-production to the milk. Each batch of cheese was inoculated with 10(2)-10(3) cfu g<sup>-1</sup> of a five-strain cocktail of *L. monocytogenes* before storage. Shelf-life analysis demonstrated that incorporation of nisin at a level of 2.5 mg l<sup>-1</sup> could effectively inhibit the growth of *L. monocytogenes* for a period of 8 weeks or more (dependent on cheese type). Cheese made without the addition of nisin contained unsafe levels of the organism within 1-2 weeks of incubation. Measurement of initial and residual nisin

indicated a high level of retention over the 10-week incubation period at 6-8 degrees C, with only 10-32% nisin loss.

**Registry Numbers**

0 (Bacteriocins). 0 (**Food Preservatives**). 1414-45-5 (Nisin).

**ISSN**

0266-8254

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9709.



☒ Citation 20**Unique Identifier**

97303804

**Authors**Sugihara N. Shimomichi K. Furuno K.**Institution**Faculty of Pharmacy and Pharmaceutical Sciences, Fukuyama University,  
Hiroshima, Japan.**Title**Cytotoxicity of **food preservatives** in cultured rat hepatocytes loaded with linolenic acid.**Source**

Toxicology. 120(1):29-36, 1997 Jun 6.

**Abbreviated Source**

Toxicology. 120(1):29-36, 1997 Jun 6.

**NLM Journal Code**

vwr

**Journal Subset**

C

**Country of Publication**

Ireland

**MeSH Subject Headings**\*alpha-Linolenic Acid / me [Metabolism]AnimalCells, CulturedComparative StudyFemale\*Food Preservatives / to [Toxicity]Glutathione / de [Drug Effects]Glutathione / me [Metabolism]Lactate Dehydrogenase / me [Metabolism]Lipid Peroxidation / de [Drug Effects]Liver / cy [Cytology]\*Liver / de [Drug Effects]Liver / me [Metabolism]MaleMalondialdehyde / me [Metabolism]RatsRats, WistarSulfhydryl Compounds / me [Metabolism]Support, Non-U.S. Gov't**Abstract**

We investigated the ability of eight **food preservatives** to induce lipid peroxidation in normal and alpha-linolenic acid (LNA)-loaded cultured rat hepatocytes. On the addition of sodium dehydroacetate (DHA-Na), potassium sorbate (SA-K) or thiabendazole (TBZ) to the cell culture, lipid peroxidation, assessed in terms of the production of malondialdehyde (MDA), was induced in LNA-loaded cells, but not in normal cells. At the low concentrations, induction of lipid peroxidation

in LNA-loaded cells was highest with TBZ, whereas at high concentrations DHA-Na greatly induced lipid peroxidation. The occurrence of lipid peroxidation in LNA-loaded cells was accompanied by a decrease in cellular GSH levels with the three **preservatives** and by a decrease in cellular protein-SH levels with DHA-Na and TBZ. Furthermore, cell injury, measured by the release of LDH, was produced in LNA-loaded cells exposed to DHA-Na and SA-K. The addition of TBZ caused substantial cell injury in normal cells, and even greater injury in LNA-loaded cells. The prevention of lipid peroxidation in LNA-loaded hepatocytes by addition of an antioxidant, N,N'-diphenyl-p-phenylenediamine (DPPD) almost completely prevented DHA-Na- and SA-K-induced cell injury, and reduced TBZ-induced cell injury. The addition of diphenyl (DP), o-phenylphenol (OPP) or butyl p-hydroxybenzoate (BHB) caused severe cell injury, in association with a marked decrease in cellular levels of both of GSH and protein-SH in both groups of cells. However, lipid peroxidation was not detectable in either group of cells exposed to these **preservatives**. Sodium propionate (PA-Na) and sodium benzoate (BA-Na) had little effect on any cytotoxic parameter in either group of cells.

**Registry Numbers**

EC 1-1-1-27 (Lactate Dehydrogenase). 0 (**Food Preservatives**). 0 (Sulphydryl Compounds).  
463-40-1 (alpha-Linolenic Acid). 542-78-9 (Malondialdehyde). 70-18-8 (Glutathione).

**ISSN**

0300-483X

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9708.



# **EXHIBIT 2**

☐ Citation 47

(13)  
(14)

**Unique Identifier**

97391307

**Authors**Turcic J. Alfircvic I. Cavcic J. Martinac P. Biocina B.**Institution**

University Department of Surgery, University Hospital Centre, Zagreb, Croatia.

**Title**

Peroxyacetic acid effect on the bacteriologic status of war wound.

**Source**

Acta Medica Croatica. 51(3):159-62, 1997.

**Abbreviated Source**

Acta Med Croatica. 51(3):159-62, 1997.

**NLM Journal Code**

bh2

**Country of Publication**

Croatia

**MeSH Subject Headings**Adult\*Anti-Infective Agents,Local / tu [Therapeutic Use]CroatiaHumanMale\*Peracetic Acid / tu [Therapeutic Use]Saline Solution, Hypertonic / tu [Therapeutic Use]\*WarWound Infection / mi [Microbiology]\*Wound Infection / pc [Prevention & Control]**Abstract**

In this study, the efficiency of peroxyacetic acid as a **local** antiseptic in war wound healing was investigated. Peroxyacetic acid was specially prepared for **local** application. The acidity was reduced from pH 2 to pH 5 using acetate buffer, the concentration was reduced to 0.2% and the use of sulfuric acid was avoided in the peroxyacetic acid preparation. Thirty-five patients with at least two similar wounds requiring daily dressing were included on a voluntary basis. Cranial wounds and wounds on the right side of the body were treated by peroxyacetic acid compresses, while other wounds were treated by the application of hypertonic NaCl solution. On day 12, the wounds treated by peroxyacetic acid ( $\chi^2 = 52$ ;  $df = 4$ ,  $P < 0.001$ ) were observed to be statistically significantly cleansed than the wounds treated conventionally. The use of peroxyacetic acid as a **local** antiseptic has not yet been described in the available literature. The possibilities and efficiency of peroxyacetic acid for this purpose, previously prepared for use in living tissue, are emphasized.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Saline Solution, Hypertonic). 79-21-0 (Peracetic Acid).

**ISSN**

1330-0164

☐ Citation 14

(12)  
(13)

**Unique Identifier**

98066955

**Authors**

Yasuda T. Yoshimura Y. Takada H. Kawaguchi S. Ito M. Yamazaki F. Iriyama J. Ishigo S. Asano Y.

**Institution**

Pharmaceutical Division, Ogaki Municipal Hospital, Japan.

**Title**

Comparison of bactericidal effects of commonly used antiseptics against pathogens causing nosocomial infections. Part 2.

**Source**

Dermatology. 195 Suppl 2:19-28, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:19-28, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Benzalkonium Compounds / ad [Administration & Dosage]Benzalkonium Compounds / tu [Therapeutic Use]Chlorhexidine / aa [Analogues & Derivatives]Chlorhexidine / ad [Administration & Dosage]Chlorhexidine / tu [Therapeutic Use]Comparative Study\*Cross Infection / dt [Drug Therapy]Disinfectants / ad [Administration & Dosage]Disinfectants / tu [Therapeutic Use]Drug Resistance, MicrobialGlycine / aa [Analogues & Derivatives]Glycine / ad [Administration & Dosage]Glycine / tu [Therapeutic Use]\*Gram-Negative Bacterial Infections / dt [Drug Therapy]HumanIodophors / ad [Administration & Dosage]Iodophors / tu [Therapeutic Use]Opportunistic Infections / dt [Drug Therapy]Povidone-Iodine / ad [Administration & Dosage]Povidone-Iodine / tu [Therapeutic Use]\*Serratia marcescens / de [Drug Effects]\*Serratia Infections / dt [Drug Therapy]

Sodium Hypochlorite / ad [Administration & Dosage]

Sodium Hypochlorite / tu [Therapeutic Use]

Time Factors

\*Xanthomonas / de [Drug Effects]

#### Abstract

Opportunistic infections caused by gram-negative rods (GNR), conventionally regarded as organisms with low or no pathogenicity, and intractable infections caused by various resistant organisms pose a great problem now. In view of this, we determined the bactericidal effects of 5 commonly used disinfectants using as the test strains *Xanthomonas maltophilia* and *Serratia marcescens*, chosen among other GNR since they often cause nosocomial infections. Regarding the bactericidal activities against *X. maltophilia* and *S. marcescens*, both sensitive strains and resistant strains were killed within 20 s of exposure to povidone-iodine and sodium hypochlorite. With chlorhexidine, 1 strain each of both species was not killed within 10 min of exposure at a concentration of 0.2%. Both sensitive strains and resistant strains of *X. maltophilia* were killed within 20 s of exposure to benzalkonium at 0.02%, while a concentration of 0.1% was required for benzalkonium to kill *S. marcescens* within 20 s. With Tego-51, both sensitive strains and resistant strains of *X. maltophilia* were killed within 20 s at 0.02%, while 1 strain of *S. marcescens* was not killed within 20 s at a concentration of 0.1%. In the use of disinfectants, comparative bactericidal effects of various disinfectants against clinical isolates should be taken into consideration.

#### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Benzalkonium Compounds). 0 (Disinfectants). 0 (Iodophors). 18472-51-0 (chlorhexidine gluconate). 25655-41-8 (Povidone-Iodine). 55-56-1 (Chlorhexidine). 56-40-6 (Glycine). 6843-97-6 (dodocin). 7681-52-9 (Sodium Hypochlorite).

#### ISSN

1018-8665

#### Publication Type

Journal Article.

#### Language

English

#### Entry Month

9805. Entry Week: 98051.





☐ Citation 13

11  
12

**Unique Identifier**

98066952

**Authors**Fleischer W. Reimer K.**Institution**

Mundipharma GmbH, Limburg, Germany.

**Title**

Povidone-iodine in antisepsis--state of the art. [Review] [27 refs]

**Source**

Dermatology. 195 Suppl 2:3-9, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:3-9, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*AntisepsisBacterial Infections / dt [Drug Therapy]Bacterial Infections / pc [Prevention & Control]Burns / dt [Drug Therapy]Chronic DiseaseEnterococcus / de [Drug Effects]Gram-Positive Bacterial Infections / dt [Drug Therapy]Hand / mi [Microbiology]HumanIntraoperative Care\*Iodophors / tu [Therapeutic Use]Methicillin ResistanceMucous Membrane / mi [Microbiology]Postoperative Care\*Povidone-Iodine / tu [Therapeutic Use]Skin / in [Injuries]Skin / mi [Microbiology]Skin Diseases, Infectious / dt [Drug Therapy]Staphylococcal Infections / dt [Drug Therapy]Staphylococcus aureus / de [Drug Effects]Wound Infection / dt [Drug Therapy]Wound Infection / pc [Prevention & Control]**Abstract**

The natural element iodine has been used for more than 150 years to prevent infection and treat wounds. Yet only due to the development of iodophors has it become possible to use this highly efficient microbicide in a wide range of medical applications. The antimicrobial spectrum is

universal. Its efficiency against clinically and epidemiologically significant new pathogens, such as methicillin-resistant *Staphylococcus aureus* and *Enterococcus* sp. has also been validated. No development of resistance has been determined. New data are also available on the excellent **local** tolerability of Betaisodona (povidone-iodine) preparations. On these grounds, a number of clinical fields exist in prophylaxis and therapy, for either once only or repeated applications: the disinfection of hands and skin, mucosa antiseptics, intra- and postoperative wound treatment, therapy of skin infections, burns and chronic wounds. [References: 27]

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Iodophors). 25655-41-8 (Povidone-Iodine).

**ISSN**

1018-8665

**Publication Type**

Journal Article. Review. Review, Tutorial.

**Language**

English

**Entry Month**

9805. Entry Week: 98051.



☒ Citation 7**Unique Identifier**

97158270

**Authors**Schmeller T. Latz-Bruning B. Wink M.**Institution**

Institut für Pharmazeutische Biologie, Universität Heidelberg, Germany.

**Title**Biochemical activities of berberine, palmatine and sanguinarine mediating chemical defence against microorganisms and herbivores.**Source**

Phytochemistry. 44(2):257-66, 1997 Jan.

**Abbreviated Source**

Phytochemistry. 44(2):257-66, 1997 Jan.

**NLM Journal Code**

alb

**Country of Publication**

United States

**MeSH Subject Headings**Acetylcholinesterase / me [Metabolism]\*Alkaloids / pd [Pharmacology]AnimalAnti-Infective Agents / pd [Pharmacology]\*Berberine / pd [Pharmacology]\*Berbines / pd [Pharmacology]\*Brain / me [Metabolism]Butyrylcholinesterase / me [Metabolism]Cell Membrane / me [Metabolism]Choline O-Acetyltransferase / ai [Antagonists & Inhibitors]Cholinesterase Inhibitors / pd [Pharmacology]DNA Polymerase I / ai [Antagonists & Inhibitors]\*Enzyme Inhibitors / pd [Pharmacology]Erythrocytes / de [Drug Effects]\*Erythrocytes / ph [Physiology]HemolysisKineticsRadioligand AssayReceptors, Adrenergic / me [Metabolism]Receptors, Muscarinic / me [Metabolism]\*Receptors, Neurotransmitter / me [Metabolism]Receptors, Serotonin / me [Metabolism]Reverse Transcriptase Inhibitors / pd [Pharmacology]Support, Non-U.S. Gov'tSwine**Abstract**The alkaloids **berberine**, palmatine and sanguinarine are toxic to insects and vertebrates and inhibit

the multiplication of bacteria, fungi and viruses. Biochemical properties which may contribute to these allelochemical activities were analysed. Acetylcholine esterase, butyrylcholinesterase, choline acetyl transferase, alpha 1- and alpha 2-adrenergic, nicotinergeric, muscarinergeric and serotonin2 receptors were substantially affected. Sanguinarine appears to be the most effective inhibitor of choline acetyl-transferase (IC50 284 nM), while the protoberberines were inactive at this target. **Berberine** and palmatine were most active at the alpha 2-receptor (binding with IC50 476 and 956 nM, respectively). Furthermore, **berberine** and sanguinarine intercalate DNA, inhibit DNA synthesis and reverse transcriptase. In addition, sanguinarine (but not **berberine**) affects membrane permeability and **berberine** protein biosynthesis. In consequence, these biochemical activities may mediate chemical defence against microorganisms, viruses and herbivores in the plants producing these alkaloids.

**Registry Numbers**

EC 2-3-1-6 (Choline O-Acetyltransferase). EC 2-7-7 (DNA Polymerase I). EC 3-1-1 (Butyrylcholinesterase). EC 3-1-1-7 (Acetylcholinesterase). 0 (Alkaloids). 0 (Anti-Infective Agents). 0 (Berbines). 0 (Cholinesterase Inhibitors). 0 (Enzyme Inhibitors). 0 (Receptors, Adrenergic). 0 (Receptors, Muscarinic). 0 (Receptors, Neurotransmitter). 0 (Receptors, Serotonin). 0 (Reverse Transcriptase Inhibitors). 2086-83-1 (**Berberine**). 2447-54-3 (sanguinarine). 3486-67-7 (palmatine).

**ISSN**

0031-9422

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9705.



☒ Citation 12**Unique Identifier**

97369110

**Authors**Iwasa K. Kamigauchi M. Sugiura M. Nanba H.**Institution**

Kobe Pharmaceutical University, Japan.

**Title**

Antimicrobial activity of some 13-alkyl substituted protoberberinium salts.

**Source**

Planta Medica. 63(3):196-8, 1997 Jun.

**Abbreviated Source**

Planta Med. 63(3):196-8, 1997 Jun.

**NLM Journal Code**

p9f

**Country of Publication**

Germany

**MeSH Subject Headings**\*Berberine / aa [Analog & Derivatives]Berberine / ch [Chemistry]\*Berberine / pd [Pharmacology]Berbines / ch [Chemistry]\*Berbines / pd [Pharmacology]Comparative StudyMicrobial Sensitivity Tests\*Staphylococcus aureus / de [Drug Effects]Structure-Activity Relationship**Abstract**

Several 13-alkyl substituted analogs of **berberine** and **palmatine** were found to be highly active against two types of *Staphylococcus aureus* (S1 and S2) of different origin. The most active 13-hexyl**berberine** was 8 times more active (against S1) and the same order active (against S2) as kanamycin sulfate. 13-Hexyl**palmatine** displayed an activity against *S. aureus* (S1) 4 times greater than that of kanamycin sulfate. The activities of 13-hexyl**berberine** against two types of *S. aureus* were 64 and 128 times greater than those of the clinically used alkaloid **berberine**. Additionally two hexyl derivatives possessed antifungal activity.

**Registry Numbers**0 (Berbines). 2086-83-1 (**Berberine**). 3486-67-7 (**palmatine**).**ISSN**

0032-0943

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9710.

11

☐ Citation 148

8  
9

**Unique Identifier**

95266371

**Authors**Hansson C. Faergemann J.**Institution**Department of Dermatology, Sahlgrens' Hospital, University of Goteborg,  
Sweden.**Title**

The effect of antiseptic solutions on microorganisms in venous leg ulcers.

**Source**

Acta Dermato-Venereologica. 75(1):31-3, 1995 Jan.

**Abbreviated Source**

Acta Derm Venereol. 75(1):31-3, 1995 Jan.

**NLM Journal Code**

0mq

**Country of Publication**

Norway

**MeSH Subject Headings**Acetic Acids / ad [Administration & Dosage]Acetic Acids / tu [Therapeutic Use]Administration, CutaneousAgedAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Bacteria / de [Drug Effects]BandagesChloramines / ad [Administration & Dosage]Chloramines / tu [Therapeutic Use]Colony Count, MicrobialFemaleHumanMalePotassium Permanganate / ad [Administration & Dosage]Potassium Permanganate / tu [Therapeutic Use]Proteus / de [Drug Effects]Proteus / ip [Isolation & Purification]Pseudomonas / de [Drug Effects]Pseudomonas / ip [Isolation & Purification]Staphylococcus aureus / de [Drug Effects]Staphylococcus aureus / ip [Isolation & Purification]Staphylococcus epidermidis / de [Drug Effects]Staphylococcus epidermidis / ip [Isolation & Purification]Streptococcus / de [Drug Effects]

Streptococcus / ip [Isolation & Purification]

Support, Non-U.S. Gov't

Tartrates / ad [Administration & Dosage]

Tartrates / tu [Therapeutic Use]

\*Varicose Ulcer / mi [Microbiology]

\*Varicose Ulcer / th [Therapy]

#### Abstract

The effect on the microbial ulcer flora of wet gauze dressings soaked in antiseptic solutions used for desloughing leg ulcers is not known. Quantitative cultures were therefore performed in 45 venous leg ulcers, before application and after 15 minutes' treatment with gauze dressings with four different antiseptic solutions: aluminium acetotartrate (Alsol) 1%, potassium permanganate 0.015%, acetic acid 0.25% and chloramine 0.25%. The percentage of ulcers with each type of microorganism did not differ before and after application of the antiseptic solutions. Staphylococcus aureus was found in 79% of the ulcers, gram-negative rods in 39%, S. epidermidis in 21%, Proteus spp in 21%, Pseudomonas spp in 14% and fungi in none. Potassium permanganate reduced the mean number of bacteria per ulcer from  $4.4 \times 10(6)$  to  $0.9 \times 10(6)$  (ns), chloramine from  $2.7 \times 10(6)$  to  $2.2 \times 10(6)$  (ns), Alsol from  $1.2 \times 10(7)$  to  $3.5 \times 10(6)$  (ns) and acetic acid from  $6.3 \times 10(6)$  to  $2.6 \times 10(5)$  ( $p = 0.007$ ). S. aureus was reduced by acetic acid ( $p = 0.002$ ), gram-negative rods by both chloramine ( $p = 0.03$ ) and acetic acid ( $p = 0.03$ ). The number of Pseudomonas, Proteus, S. epidermidis and Streptococcus haemolyticus group G was not reduced significantly ( $p > 0.05$ ) by any of the solutions.

#### Registry Numbers

0 (acetotartaric acid). 0 (Acetic Acids). 0 (Anti-Infective Agents, Local). 0 (Chloramines). 0 (Tartrates). 10599-90-3 (chloramine). 7722-64-7 (Potassium Permanganate).

#### ISSN

0001-5555

#### Publication Type

Journal Article.

#### Language

English

#### Entry Month

9508.





8

☐ Citation 141**Unique Identifier**

96045103

**Authors**Elworthy AJ. Edgar R. Moran J. Addy M. Mover R. Kelty E. Wade WG.**Institution**

Department of Periodontology, Dental School, University of Wales College of Medicine, Health Park, Cardiff, UK.

**Title**

A 6-month home-usage trial of 0.1% and 0.2% delmopinol mouthwashes (II). Effects on the plaque microflora.

**Source**

Journal of Clinical Periodontology. 22(7):527-32, 1995 Jul.

**Abbreviated Source**

J Clin Periodontol. 22(7):527-32, 1995 Jul.

**NLM Journal Code**

ht7

**Journal Subset**

D

**Country of Publication**

Denmark

**MeSH Subject Headings**AdolescenceAdultAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Bacteria / de [Drug Effects]Bacteria / ip [Isolation & Purification]Bacteria, Aerobic / de [Drug Effects]Bacteria, Aerobic / ip [Isolation & Purification]Candida / de [Drug Effects]Candida / ip [Isolation & Purification]Colony Count, MicrobialComparative Study\*Dental Plaque / mi [Microbiology]Dextrans / me [Metabolism]Fusobacterium nucleatum / de [Drug Effects]Fusobacterium nucleatum / ip [Isolation & Purification]Gram-Negative Bacteria / de [Drug Effects]Gram-Negative Bacteria / ip [Isolation & Purification]HumanMiddle AgeMorpholines / ad [Administration & Dosage]\*Morpholines / tu [Therapeutic Use]



\*Mouthwashes

\*Oral Hygiene

Prevotella intermedia / de [Drug Effects]

Prevotella intermedia / ip [Isolation & Purification]

Streptococcus / de [Drug Effects]

Streptococcus / ip [Isolation & Purification]

Streptococcus / me [Metabolism]

Surface-Active Agents / ad [Administration & Dosage]

\*Surface-Active Agents / tu [Therapeutic Use]

#### **Abstract**

The effects of 0.1% and 0.2% delmopinol mouthwashes on supragingival plaque flora were investigated in a 6-month home-use study. 141 subjects were studied from whom plaque was collected at baseline, 12, 24, and 36 weeks. Overall, there were no consistent effects on microscopic or total counts. However, there was a significant reduction in the proportion of dextran-producing streptococci in the active groups compared to the control group throughout treatment. There was no colonisation by Candida or Gram-negative aerobic bacilli in the active groups nor was there any decrease in susceptibility to delmopinol. Delmopinol appears to mediate its anti-plaque effect without causing a major shift in bacterial populations, although dextran-producing bacteria appear to be affected, which may have relevance to this agent's mode of action.

#### **Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Morpholines). 0 (Mouthwashes). 0 (Surface-Active Agents). 79874-76-3 (delmopinol). 9004-54-0 (Dextrans).

#### **ISSN**

0303-6979

#### **Publication Type**

Journal Article.

#### **Language**

English

#### **Entry Month**

9601.





4777  
7

☐ Citation 125**Unique Identifier**

96169713

**Authors**Bibel DJ. Aly R. Shinefield HR.**Institution**Department of Dermatology, University of California at San Francisco  
94143-0517, USA.**Title**

Topical sphingolipids in antisepsis and antifungal therapy.

**Source**

Clinical &amp; Experimental Dermatology. 20(5):395-400, 1995 Sep.

**Abbreviated Source**

Clin Exp Dermatol. 20(5):395-400, 1995 Sep.

**NLM Journal Code**

ddu

**Country of Publication**

England

**MeSH Subject Headings**Animal\*Anti-Infective Agents.Local / tu [Therapeutic Use]\*Antifungal Agents / tu [Therapeutic Use]Candida albicansDrug ScreeningFemaleGuinea PigsHumanMale\*Skin Diseases, Infectious / dt [Drug Therapy]\*Sphingolipids / tu [Therapeutic Use]Staphylococcus aureusSupport, Non-U.S. Gov't**Abstract**

Sphingosine and sphinganine, free sphingolipids of the stratum corneum, are, in vitro, strongly inhibitory for both bacteria and fungi. Whether or not they are suitable, indeed active, in vivo was examined: (i) on human volunteers, first as a preventative antiseptic against subsequently applied *Staphylococcus aureus* and *Candida albicans*, and second as a restorative antiseptic against the previously expanded normal skin flora; and (ii) on guinea-pigs as therapy for experimental *C. albicans* and *Trichophyton mentagrophytes* infections. In the antiseptic studies, which involved 200 micrograms/cm<sup>2</sup> of sphinganine in ethanol (50 microliters of a 1.6% solution), up to three-log reductions in the population of target micro-organisms were obtained, compared with vehicle and untreated controls ( $P < 0.001$ ). The daily application of sphingosine as 1.5% ethanol-petrolatum ointment was able to diminish inflammation slightly in dermatophyte-infected guinea-pigs ( $P = 0.02-0.05$ ), although the animals remained culture positive over the 3-week sampling period. The candida infections, treated daily with 1.5% sphinganine in ethanol, showed no improvement in

inflammation compared with controls, except for 2 days of the 2-week observation period ( $P = 0.01-0.03$ ); however, by the fourth day of therapy the yeast was eliminated in 75% of animals. No gross toxicity was observed among animals or human volunteers. These experiments further support simple sphingolipids as important antimicrobial agents of the cutaneous barrier and point toward a new biochemical approach in treating infectious disease.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Antifungal Agents). 0 (Sphingolipids).

**ISSN**

0307-6938

**Publication Type**

Clinical Trial. Controlled Clinical Trial. Journal Article.

**Language**

English

**Entry Month**

9606.



☐ Citation 114

6

**Unique Identifier**

96047560

**Authors**Ahmed K. Roberts ML. Mannion PT.**Institution**

Department of Otolaryngology/Head and Neck Unit, Royal Liverpool University Hospital, UK.

**Title**

Antimicrobial activity of glycerine-ichthammol in otitis externa.

**Source**

Clinical Otolaryngology. 20(3):201-3, 1995 Jun.

**Abbreviated Source**

Clin Otolaryngol. 20(3):201-3, 1995 Jun.

**NLM Journal Code**

dcq

**Country of Publication**

England

**MeSH Subject Headings**\*Ammonium Compounds / pd [Pharmacology]\*Ammonium Compounds / tu [Therapeutic Use]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Antibiotics, Combined / tu [Therapeutic Use]Candida albicans / de [Drug Effects]Candida albicans / ip [Isolation & Purification]Ear, External / mi [Microbiology]Escherichia coli / de [Drug Effects]Escherichia coli / ip [Isolation & Purification]\*Glycerol / pd [Pharmacology]\*Glycerol / tu [Therapeutic Use]Human\*Otitis Externa / dt [Drug Therapy]Otitis Externa / mi [Microbiology]Pseudomonas aeruginosa / de [Drug Effects]Pseudomonas aeruginosa / ip [Isolation & Purification]Staphylococcus aureus / de [Drug Effects]Staphylococcus aureus / ip [Isolation & Purification]Streptococcus pyogenes / de [Drug Effects]Streptococcus pyogenes / ip [Isolation & Purification]**Abstract**

The clinical efficacy of glycerine-ichthammol in otitis externa may be due to an anti-inflammatory action of ichthammol or a dehydrating effect of glycerine on the oedematous ear canal. Its antimicrobial activity, if any, against the common organisms in otitis externa is not well known. A study of the antibacterial property of glycerine-ichthammol as measured by a growth inhibition test and a modified cidal assay, showed inhibition of selected gram positive organisms (Streptococcus

pyogenes and Staphylococcus aureus) by ichthammol and glycerine-ichthammol combination, but only negligible antibacterial activity against Pseudomonas aeruginosa and Escherichia coli. Candida albicans was also weakly inhibited. As the activity against gram negative organisms is minimal, incorporation of an anti-gram negative antibiotic such as gentamicin in the glycerine-ichthammol compound to enhance its antibacterial spectrum is suggested.

**Registry Numbers**

0 (Ammonium Compounds). 0 (**Anti-Infective Agents, Local**). 0 (Antibiotics, Combined). 56-81-5 (Glycerol). 8029-68-3 (ichthammol).

**ISSN**

0307-7772

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9601.





4

☐ Citation 99**Unique Identifier**

96354961

**Authors**Pignataro O. Pignataro LD. Gallus G. Calori G. Cordaro CI.**Institution**

Institute of Clinical Otorhinolaryngology, University of Milan, Italy.

**Title**

Otitis media with effusion and S-carboxymethylcysteine and/or its lysine salt: a critical overview.

**Source**

International Journal of Pediatric Otorhinolaryngology. 35(3):231-41, 1996 May.

**Abbreviated Source**

Int J Pediatr Otorhinolaryngol. 35(3):231-41, 1996 May.

**NLM Journal Code**

gs2

**Country of Publication**

Ireland

**MeSH Subject Headings**AdolescenceAdultAgedAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Carbocysteine / ad [Administration & Dosage]\*Carbocysteine / tu [Therapeutic Use]ChildChild, PreschoolClinical TrialsDose-Response Relationship, DrugHumanLysine / ad [Administration & Dosage]\*Lysine / tu [Therapeutic Use]\*Otitis Media with Effusion / dt [Drug Therapy]Treatment Outcome**Abstract**

An overview of the placebo-comparative articles retrieved by a literature search on Medline - Embase - Biosis data banks from 1972 to 1993 was performed to evaluate the therapeutic relevance of the medical treatment with S-carboxymethylcysteine (SCMC) and its monohydrate lysine salt (SCMC-LYS) in patients with otitis media with effusion (OME). Ten original published studies were reviewed by an independent physician who assessed their quality by standard nine-items methodology. A meta-analytical approach was used to compare outcomes across all qualifying studies. Because of the heterogeneity of clinical endpoints, a new outcome measure was defined, i.e. overall clinical improvement, which consisted of the number of patients with complete resolution of clinical signs and symptoms and no need for surgical intervention. The objective evaluation criteria

of normalisation of tympanogram was an additional end-point. Potential confounding variables such as eligibility criteria, treatment protocol and study design of the six methodologically complying studies were statistically homogeneous. No association was found between treatment effect-size and publication date or patients' age. Outpatients with disease duration of < 6 months, not previously treated, with bilateral ear involvement were included in the studies; half of them presented hyperplasia or hypertrophy of the pharyngeal or the adenoid tissue. Out of 483 patients, 430 (89%) terminated studies and were evaluable. Results from this meta-analysis indicate that patients with OME receiving oral SCMC/-lys benefit from the medical treatment to the extent of avoiding surgical intervention approximately 2.31 times more often than similar patients receiving placebo (ratio of active drug to placebo-effect on overall clinical improvement: 2.31; C.I. 1.28-4.20,  $P < 0.01$ ) and attain reversion to normal of the tympanogram at an extent close to statistical significance (odds ratio: 2.25, C.I. 0.97-5.22,  $P = 0.058$ ). In conclusion, the use of this new methodology for the evaluation of the mucoactive drug effect in OME has shed light into methodological pitfalls of clinical trials to date and underlines the need for agreed outcome measures, which may modify medical policy, which addresses more and more often to symptomatic treatment.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 2387-59-9 (Carbocysteine). 56-87-1 (Lysine).

**ISSN**

0165-5876

**Publication Type**

Journal Article. Meta-Analysis.

**Language**

English

**Entry Month**

9701.



5


☐ Citation 112

**Unique Identifier**

96256536

**Authors**
Babay N. Al Jasser N.
**Institution**

Division of Periodontics, King Saud University, College of Dentistry, Riyadh,  
Saudia Arabia.

**Title**

Subgingival irrigation effects of chlorhexidine or sanguinarine on gingivitis in orthodontic patients.

**Source**

Journal of Clinical Pediatric Dentistry. 20(3):225-8, 1996 Spring.

**Abbreviated Source**

J Clin Pediatr Dent. 20(3):225-8, 1996 Spring.

**NLM Journal Code**

ax5

**Journal Subset**

D

**Country of Publication**

United States

**MeSH Subject Headings**
Adolescence
Alkaloids / ad [Administration & Dosage]
\*Alkaloids / tu [Therapeutic Use]
Analysis of Variance
\*Anti-Infective Agents,
Local / tu [Therapeutic Use]
Child
\*Chlorhexidine / aa [Analogues & Derivatives]
Chlorhexidine / ad [Administration & Dosage]
Chlorhexidine / tu [Therapeutic Use]
Comparative Study
Dental Plaque / co [Complications]
Dental Plaque / dt [Drug Therapy]
Dental Plaque / et [Etiology]
Dental Plaque Index
Gingival Hemorrhage / dt [Drug Therapy]
\*Gingivitis / dt [Drug Therapy]
Gingivitis / et [Etiology]
Human
Irrigation / mt [Methods]
Molar
\*Mouthwashes / tu [Therapeutic Use]
Multivariate Analysis
\*Orthodontic Appliances / ae [Adverse Effects]
Periodontal Index



Single-Blind MethodSodium Chloride / tu [Therapeutic Use]**Abstract**

This clinical investigation examined the effect of a single subgingival irrigation of chlorhexidine 0.2% or sanguinarine on gingivitis affecting orthodontically banded first molars in adolescent patients. Eighteen patients with gingivitis participated in the study. Probing depth, papilla bleeding index and plaque index were recorded at four sites for three molars at baseline, 2 weeks and 4 weeks by one investigator. A second investigator irrigated a single application of 3 ml of either chlorhexidine, sanguinarine or saline. The gingival bleeding as determined by papilla bleeding index was almost eliminated in the 4 week period. A reduction of the plaque index and probing depth was observed in all three groups. A significant difference related to probing depth between the effect of saline and chlorhexidine ( $p < 0.01$ ) was noted.

**Registry Numbers**

0 (Alkaloids). 0 (Anti-Infective Agents, Local). 0 (Mouthwashes). 18472-51-0 (chlorhexidine gluconate). 2447-54-3 (sanguinarine). 55-56-1 (Chlorhexidine). 7647-14-5 (Sodium Chloride).

**ISSN**

1053-4628

**Publication Type**

Clinical Trial. Controlled Clinical Trial. Journal Article.

**Language**

English

**Entry Month**

9609.





(3)

☐ Citation 96**Unique Identifier**

97074604

**Authors**Mimoz O. Pieroni L. Lawrence C. Edouard A. Costa Y. Samii K. Brun-Buisson C.**Institution**Service d'Anesthesie-Reanimation, Universite de Paris Sud, Hopital Bicetre,  
Le Kremlin Bicetre, France.**Title**

Prospective, randomized trial of two antiseptic solutions for prevention of central venous or arterial catheter colonization and infection in intensive care unit patients.

**Source**

Critical Care Medicine. 24(11):1818-23, 1996 Nov.

**Abbreviated Source**

Crit Care Med. 24(11):1818-23, 1996 Nov.

**NLM Journal Code**

dtf

**Journal Subset**

A

**Country of Publication**

United States

**MeSH Subject Headings**Adult\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Benzalkonium Compounds / tu [Therapeutic Use]\*Catheterization, Central Venous\*Chlorhexidine / aa [Analog & Derivatives]Chlorhexidine / tu [Therapeutic Use]Comparative Study\*Cross Infection / pc [Prevention & Control]\*Equipment Contamination / pc [Prevention & Control]Gram-Negative Bacteria / de [Drug Effects]Gram-Negative Bacteria / ip [Isolation & Purification]Gram-Positive Bacteria / de [Drug Effects]Gram-Positive Bacteria / ip [Isolation & Purification]HumanIntensive Care UnitsMiddle Age\*Mouthwashes / tu [Therapeutic Use]\*Povidone-Iodine / tu [Therapeutic Use]Prospective StudiesSupport, Non-U.S. Gov't**Abstract**

**OBJECTIVES:** To compare the efficacy of a newly available antiseptic solution (composed of 0.25% chlorhexidine gluconate, 0.025% benzalkonium chloride, and 4% benzyl alcohol), with 10%

povidone iodine, on the prevention of central venous or arterial catheter colonization and infection.

**DESIGN:** Prospective, randomized clinical trial.

**SETTING:** Surgical-trauma intensive care unit (ICU) in a university hospital.

**PATIENTS:** All patients admitted to the ICU and requiring the insertion of a central venous and/or an arterial catheter from July 1, 1992 to October 31, 1993.

**INTERVENTIONS:** Patients were randomly assigned to one of two groups according to the antiseptic solution used for insertion and catheter care. The same solution was used for skin disinfection from the time of catheter insertion to the time of removal of each catheter.

**MEASUREMENTS AND MAIN RESULTS:** Catheter distal tips were quantitatively cultured when catheters were no longer necessary, if there was a suspicion of catheter-related infection, and routinely after 7 days of use for arterial catheters, or after 15 days of use for central venous catheters. The rate of significant catheter colonization (i.e.,  $\geq 10^3$  colony-forming units [cfu]/mL by quantitative culture), and catheter-related sepsis (as defined by sepsis abating following catheter removal per 1,000 catheter-days), were significantly lower in the chlorhexidine group (12 vs. 31 [relative risk 0.4, 95% confidence interval 0.1 to 0.9,  $p < .01$ ] and 6 vs. 16 [relative risk 0.4, 95% confidence interval 0.1 to 1,  $p = 0.5$ ], respectively). The rate of central venous catheter colonization and central venous catheter-related sepsis per 1,000 catheter-days were also significantly lower in the chlorhexidine group (8 vs. 31 [relative risk 0.3, 95% confidence interval 0.1 to 1,  $p = .03$ ] and 5 vs. 19 [relative risk 0.3, 95% confidence interval 0.1 to 1,  $p = .02$ ], respectively). Finally, the rate of arterial catheter colonization per 1,000 catheter-days was significantly lower in the chlorhexidine group (15 vs. 32 [relative risk 0.5, 95% confidence interval 0.1 to 1,  $p = .05$ ]), whereas the rate of arterial catheter-related sepsis per 1,000 catheter-days was similar for the two study groups (8 in the chlorhexidine group vs. 10 in the povidone iodine group [relative risk 0.8, 95% confidence interval 0.1 to 2.2,  $p = .6$ ]). The 0.25% chlorhexidine solution was superior to the 10% povidone iodine solution in preventing catheter colonizations and catheter-related sepsis due to Gram-positive bacteria (5 vs. 20 [ $p < .001$ ], and 2 vs. 10 [ $p < .001$ ], respectively), whereas the activity of the 0.25% chlorhexidine solution was nonsignificantly superior in preventing Gram-negative infections (7 vs. 4 [ $p = .5$ ], and 4 vs. 2 [ $p = .8$ ], respectively).

**CONCLUSIONS:** The 4% alcohol-based solution of 0.25% chlorhexidine gluconate and 0.025% benzalkonium chloride was more effective than 10% povidone iodine for insertion site care of short-term central venous and arterial catheters. This effect appeared related to a more efficacious prevention of infections with Gram-positive bacteria.

#### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Benzalkonium Compounds). 0 (Mouthwashes). 18472-51-0 (chlorhexidine gluconate). 25655-41-8 (Povidone-Iodine). 55-56-1 (Chlorhexidine).

#### ISSN

0090-3493

#### Publication Type

Clinical Trial. Journal Article. Randomized Controlled Trial.

#### Language

English

#### Entry Month

9702.



(2)

☐ Citation 76**Unique Identifier**

97161774

**Authors**Chander J. Maini S. Subrahmanyam S. Handa A.**Institution**Department of Microbiology, Government Medical College Hospital, Chandigarh,  
India.**Title**

Otomycosis--a clinico-mycological study and efficacy of mercurochrome in its treatment.

**Source**

Mycopathologia. 135(1):9-12, 1996.

**Abbreviated Source**

Mycopathologia. 135(1):9-12, 1996.

**NLM Journal Code**

no4

**Country of Publication**

Netherlands

**MeSH Subject Headings**Adult\*Anti-Infective Agents,Local / tu [Therapeutic Use]Antifungal Agents / tu [Therapeutic Use]Aspergillus / ip [Isolation & Purification]Candida / ip [Isolation & Purification]Clotrimazole / tu [Therapeutic Use]Diabetes Mellitus / co [Complications]\*Ear Diseases / dt [Drug Therapy]\*Ear Diseases / mi [Microbiology]FemaleHumanMale\*Merbromin / tu [Therapeutic Use]Miconazole / tu [Therapeutic Use]Mucor / ip [Isolation & Purification]\*Mycoses / dt [Drug Therapy]\*Mycoses / mi [Microbiology]Prospective Studies**Abstract**

A total of 110 patients of symptomatic otomycosis was investigated, prospectively. Aural swabs were collected on 1st, 7th and 14th day and examined by direct microscopy and culture for fungi. Of these, 80 patients found to be having pure fungal infection, were taken up for mycological and therapeutic study. Fungi belonging to genus *Aspergillus* were isolated in 76 (95.0%) patients of which *Aspergillus niger* was the commonest isolate in 46 (57.5%), followed by *A. flavus* in 27 (33.7%), *A. fumigatus* in 3 (3.7%), *Candida* species in 3 (3.7%) and *Mucor* in 1 (1.2%). The patients were of all age groups but majority were between 21 and 30 years and the male-female ratio

was equal. Of the total of 40 male patients, twenty-one were Sikhs using turban. Before developing the symptoms, forty five patients used oil, mixture of oil and garlic juice, antibiotics, steroids, antiseptics or wax solvent as ear drops. Only two patients were diabetic. No patient had fungal infection elsewhere in the body. The patients were called for regular follow-up for three weeks. In forty cases mercurochrome was applied as the antifungal agent after cleaning the external auditory canal, in twenty-three clotrimazole and in rest of the seventeen patients miconazole was used. On 7th day, only 11 (13.7%) patients grew different fungi in culture. They became symptom-free on 14th day and no fungal material could be seen on otoscopy, direct microscopy or culture. Mercurochrome was found to be most effective in these patients.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Antifungal Agents). 129-16-8 (Merbromin). 22916-47-8 (Miconazole). 23593-75-1 (Clotrimazole).

**ISSN**

0301-486X

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9705.



☐ Citation 71**Unique Identifier**

96297288

**Authors**Nilssen E. Wormald PJ. Oliver S.**Institution**Department of Otorhinolaryngology, Groote Schuur Hospital, Cape Town,  
Republic of South Africa.**Title**

Glycerol and ichthammol: medicinal solution or mythical potion?.

**Source**

Journal of Laryngology &amp; Otology. 110(4):319-21, 1996 Apr.

**Abbreviated Source**

J Laryngol Otol. 110(4):319-21, 1996 Apr.

**NLM Journal Code**

iwn

**Journal Subset**

A

**Country of Publication**

England

**MeSH Subject Headings**\*Ammonium Compounds / tu [Therapeutic Use]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Dermatologic Agents / tu [Therapeutic Use]Drug CarriersDrug Combinations\*Glycerol / tu [Therapeutic Use]Human\*Otitis Externa / dt [Drug Therapy]Otitis Externa / mi [Microbiology]Proteus / de [Drug Effects]Proteus Infections / dt [Drug Therapy]Pseudomonas aeruginosa / de [Drug Effects]Pseudomonas Infections / dt [Drug Therapy]Staphylococcal Infections / dt [Drug Therapy]Staphylococcus aureusStreptococcal Infections / dt [Drug Therapy]Streptococcus pyogenes / de [Drug Effects]**Abstract**

Glycerol and ichthammol (G & I) has been used for generations by otologists. However, there is a paucity of information on both its mode of action and its anti-bacterial properties. The aim of this paper was to ascertain firstly, what the most common organisms found in discharging ears were and secondly, what antibacterial activity G & I had against these organisms. All ear swabs from 1992-1994 in our unit were reviewed to ascertain the prevalence of the commonly isolated organisms. Fresh isolates of these organisms were collected and plated onto agar with wells of

glycerol, ichthammol and a combination of both as used in clinical practice. The diameters of the zones of inhibition observed after incubation were measured in millimetres. Common isolates were: *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Streptococcus pyogenes* in descending order of frequency. Pure glycerol showed no significant zones of inhibition against any of the organisms tested. The average zones of inhibition for G & I and ichthammol alone were for *Staphylococcus aureus* 15 mm and 18 mm and for *Streptococcus pyogenes*: 16 mm and 23 mm. Ichthammol alone was significantly more effective than G & I ( $p < 0.001$ ). There was no significant activity against *Proteus mirabilis* and *Pseudomonas aeruginosa*. The therapeutic benefit of G & I is due in part to the inherent anti-bacterial activity of ichthammol against the Gram positive organisms as well as its anti-inflammatory action and the dehydrating effect of the glycerol.

**Registry Numbers**

0 (Ammonium Compounds). 0 (**Anti-Infective Agents, Local**). 0 (Dermatologic Agents). 0 (Drug Carriers). 0 (Drug Combinations). 56-81-5 (Glycerol). 8029-68-3 (ichthammol).

**ISSN**

0022-2151

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9612.



☐ Citation 12**Unique Identifier**

98066957

**Authors**Michel D. Zach GA.**Institution**

Swiss Paraplegic Center, Nottwil, Switzerland.

**Title**

Antiseptic efficacy of disinfecting solutions in suspension test in vitro against methicillin-resistant Staphylococcus aureus, Pseudomonas aeruginosa and Escherichia coli in pressure sore wounds after spinal cord injury.

**Source**

Dermatology. 195 Suppl 2:36-41, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:36-41, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**Ammonium Compounds / ad [Administration & Dosage]Ammonium Compounds / tu [Therapeutic Use]Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Biguanides / ad [Administration & Dosage]Biguanides / tu [Therapeutic Use]Chlorhexidine / aa [Analogues & Derivatives]Chlorhexidine / ad [Administration & Dosage]Chlorhexidine / tu [Therapeutic Use]Decubitus Ulcer / dt [Drug Therapy]\*Decubitus Ulcer / mi [Microbiology]\*Escherichia coli / de [Drug Effects]\*Escherichia coli Infections / dt [Drug Therapy]Flavones / ad [Administration & Dosage]Flavones / tu [Therapeutic Use]HumanIodophors / ad [Administration & Dosage]Iodophors / tu [Therapeutic Use]\*Methicillin ResistanceOils, Volatile / ad [Administration & Dosage]Oils, Volatile / tu [Therapeutic Use]Povidone-Iodine / ad [Administration & Dosage]Povidone-Iodine / tu [Therapeutic Use]\*Pseudomonas aeruginosa / de [Drug Effects]*Povidone-iodine*



\*Pseudomonas Infections / dt [Drug Therapy]

Pyridines / ad [Administration & Dosage]

Pyridines / tu [Therapeutic Use]

Serum Albumin / pd [Pharmacology]

Skin / mi [Microbiology]

\*Spinal Cord Injuries / co [Complications]

\*Staphylococcal Infections / dt [Drug Therapy]

\*Staphylococcus aureus / de [Drug Effects]

### Abstract

In pressure sore wounds after spinal cord injury, methicillin-resistant *Staphylococcus aureus* can be detected in 2% of the cases. The elimination of the germ is the aim of the treatment. Pressure sore wounds are an often found complication after spinal cord injury. For **local** treatment five commercially available antiseptics for the skin and mucous membrane were tested in vitro. The method used is a modified qualitative and quantitative suspension test. The antiseptics were tested without and with addition of 5% albumin in order to simulate the conditions of the wound in vivo. The results show a superior efficacy of the povidone-iodine preparations. Betadine, probably due to the higher concentration, is more efficacious than Braunol; chlorhexidine is sufficiently efficacious without the addition of albumin. These results still have to be confirmed by in vivo studies.

### Registry Numbers

0 (Ammonium Compounds). 0 (**Anti-Infective Agents, Local**). 0 (Biguanides). 0 (Flavones). 0 (Iodophors). 0 (Oils, Volatile). 0 (Pyridines). 0 (Serum Albumin). 18472-51-0 (chlorhexidine gluconate). 25655-41-8 (Povidone-Iodine). 28757-47-3 (Baqacil). 55-56-1 (Chlorhexidine). 71251-02-0 (octenidine). 8002-66-2 (chamomile).

### ISSN

1018-8665

### Publication Type

Journal Article.

### Language

English

### Entry Month

9805. Entry Week: 98051.



☐ Citation 2**Unique Identifier**

97429419

**Authors**Fisher AA.**Title**

The sulfites: Part III. Facts about sulfites [news].

**Source**

Cutis. 60(2):73-4, 1997 Aug.

**Abbreviated Source**

Cutis. 60(2):73-4, 1997 Aug.

**NLM Journal Code**

dxb

**Country of Publication**

United States

**MeSH Subject Headings**\*Food Preservatives / ae [Adverse Effects]Human\*Preservatives, Pharmaceutical / ae [Adverse Effects]\*Sulfites / ae [Adverse Effects]United StatesUnited States Food and Drug Administration**Registry Numbers**0 (Food Preservatives). 0 (Preservatives, Pharmaceutical). 0 (**Sulfites**).**ISSN**

0011-4162

**Publication Type**

News.

**Language**

English

**Entry Month**

9801.



☐ Citation 26**Unique Identifier**

98065800

**Authors**Tennenberg S. Lieser M. McCurdy B. Boomer G. Howington E. Newman C. Wolf I.**Institution**Department of Surgery, Detroit Veterans Affairs Medical Center, Wayne State  
University School of Medicine, Mich 48201-1932, USA.**Title**

A prospective randomized trial of an antibiotic- and antiseptic-coated central venous catheter in the prevention of catheter-related infections.

**Source**

Archives of Surgery. 132(12):1348-51, 1997 Dec.

**Abbreviated Source**

Arch Surg. 132(12):1348-51, 1997 Dec.

**NLM Journal Code**

8ia

**Journal Subset**

A, C

**Country of Publication**

United States

**MeSH Subject Headings**Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Catheterization, Central Venous / ae [Adverse Effects]Catheterization, Central Venous / is [Instrumentation]\*Catheterization, Central VenousChlorhexidine / ad [Administration & Dosage]\*Chlorhexidine / tu [Therapeutic Use]HumanMiddle AgeProspective Studies\*Septicemia / pc [Prevention & Control]Silver Sulfadiazine / ad [Administration & Dosage]\*Silver Sulfadiazine / tu [Therapeutic Use]Support, Non-U.S. Gov't**Abstract****OBJECTIVE:** To test the efficacy of the ARROWgard (Arrow International Inc, Reading, Pa) central venous catheter (CVC) coated with silver sulfadiazine and chlorhexidine (A-CVC) in the prevention of CVC-related infections.**DESIGN:** Prospective, randomized trial.**SETTING:** A tertiary care medical center.**PATIENTS AND INTERVENTION:** Two hundred eighty-two patients who required CVC placement were evaluated in this study. Patients were prospectively randomized to receive either a

standard CVC (S-CVC) or the A-CVC. Only fresh-stick double- and triple-lumen catheters were studied. MAIN

**OUTCOME MEASURES:** Patients were evaluated for catheter site inflammation, catheter site colonization, **local** catheter-related infection, and catheter-related septicemia.

**RESULTS:** The 2 groups were matched for age, percentage in the intensive care unit, percentage receiving total parenteral nutrition, percentage with triple-lumen catheters, and duration of catheterization. Rates of catheter site inflammation in the 2 groups were similar (12% vs 10%, S-CVC group and A-CVC group, respectively). The A-CVC was associated with a significantly decreased catheter site colonization rate (49% vs 28%; 43% reduction;  $P<.001$ ) and **local** catheter-related infection rate (22.4% vs 5.8%; 74% reduction;  $P<.001$ ). Rates of catheter-related septicemia were reduced by 41% in the A-CVC group (6.4% vs 3.8%, S-CVC group and A-CVC group, respectively), but this was not statistically significant.

**CONCLUSIONS:** Despite a marked decrease in catheter site colonization and catheter-related infection rates, the A-CVC did not significantly reduce the incidence of catheter-related septicemia. This may be due to a greater pathogenic dependence on catheter hub contamination rather than catheter site colonization or **local** catheter-related infection, or the relatively short (5.2 days) duration of catheterization in this study.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 22199-08-2 (Silver Sulfadiazine). 55-56-1 (Chlorhexidine).

**ISSN**

0004-0010

**Publication Type**

Clinical Trial. Journal Article. Randomized Controlled Trial.

**Language**

English

**Entry Month**

9803. Entry Week: 98032.



☐ Citation 28**Unique Identifier**

98055141

**Authors**Lambert PM. Morris HF. Ochi S.**Institution**Dental Service, Department of Veterans Affairs Medical Center, Dayton, OH,  
USA.**Title**

The influence of 0.12% chlorhexidine digluconate rinses on the incidence of infectious complications and implant success.

**Source**

Journal of Oral &amp; Maxillofacial Surgery. 55(12 Suppl 5):25-30, 1997 Dec.

**Abbreviated Source**

J Oral Maxillofac Surg. 55(12 Suppl 5):25-30, 1997 Dec.

**NLM Journal Code**

jic

**Journal Subset**

A, D

**Country of Publication**

United States

**MeSH Subject Headings**AdultAgedAged, 80 and overAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Chlorhexidine / aa [Analogues & Derivatives]Chlorhexidine / ad [Administration & Dosage]Chlorhexidine / tu [Therapeutic Use]DatabasesDental Alloys\*Dental Implantation, Endosseous\*Dental ImplantsDental Prosthesis DesignDental Restoration FailureDurapatiteFemaleHumanLongitudinal StudiesMaleMiddle Age\*Mouthwashes / tu [Therapeutic Use]Prospective Studies

\*Surgical Wound Infection / pc [Prevention & Control]TitaniumTreatment OutcomeWound Healing**Abstract**

The effect of perioperative chlorhexidine on the frequency of infectious complications through stage II was examined. Chlorhexidine was used perioperatively in 54.6% of patients (52.5% of implants) in a Dental Implant Clinical Research Group study with a database of 2,641 implants (595 patients). With chlorhexidine, there was a significant reduction in the number of infectious complications (4.1% vs 8.7%). Two percent of implants failed in the absence of an infectious complication, whereas 12% with infectious complications failed. This sixfold difference is highly significant. Chlorhexidine may reduce microbial complications when used in the immediate perioperative period.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Dental Alloys). 0 (Dental Implants). 0 (Mouthwashes). 12743-70-3 (titanium alloy (TiAl6V4)). 1306-06-5 (Durapatite). 18472-51-0 (chlorhexidine gluconate). 55-56-1 (Chlorhexidine). 7440-32-6 (Titanium).

**ISSN**

0278-2391

**Publication Type**

Clinical Trial. Journal Article. Multicenter Study. Randomized Controlled Trial.

**Language**

English

**Entry Month**

9803. Entry Week: 98031.



☐ Citation 1**Unique Identifier**

98092324

**Authors**Sakurai S. Shiojima I. Tanigawa T. Nakahara K.**Institution**

Department of Central Laboratory, Tokyo University Hospital, Japan.

**Title**

Aminoglycosides prevent and dissociate the aggregation of platelets in patients with EDTA-dependent pseudothrombocytopenia.

**Source**

British Journal of Haematology. 99(4):817-23, 1997 Dec.

**Abbreviated Source**

Br J Haematol. 99(4):817-23, 1997 Dec.

**NLM Journal Code**

axc

**Journal Subset**

C

**Country of Publication**

England

**MeSH Subject Headings**AdolescenceAdultAgedAged, 80 and over\*Antibiotics, Aminoglycoside / tu [Therapeutic Use]\*Edetic Acid / ae [Adverse Effects]FemaleHuman\*Kanamycin / tu [Therapeutic Use]MaleMiddle Age\*Platelet Aggregation / de [Drug Effects]\*Platelet Aggregation Inhibitors / tu [Therapeutic Use]Platelet Count\*Thrombocytopenia / bl [Blood]Thrombocytopenia / ci [Chemically Induced]**Abstract**

Although EDTA-dependent pseudothrombocytopenia (EDTA-PTCP) is of practical importance because failure to recognize this clinical entity may result in misdiagnosis and subsequent mismanagement of the patients, the pathophysiological nature of EDTA-PTCP remains unknown. To develop an effective way to evaluate the platelet counts in patients with EDTA-PTCP, we introduced aminoglycosides-supplemented anticoagulating agents. When **kanamycin** was pre-supplemented with EDTA for anticoagulating blood samples from EDTA-PTCP patients there was no significant change in the platelet counts and the morphology of blood cells after 150 min of incubation at room temperature. Furthermore, when **kanamycin** was added to

EDTA-anticoagulated blood samples from EDTA-PTCP patients within 30 min after blood withdrawal, rapid dissociation of platelets without apparent morphological changes of blood cells was observed, and complete blood cell counts as well as the histogram patterns were almost the same as those examined immediately after blood sampling. The dissociation of aggregated platelets was also detected when other antibiotics were used, although it was associated with some extent of morphological changes of blood cells. These findings indicate that the supplementation of aminoglycosides either before or after blood sampling is a useful method for the diagnosis EDTA-PTCP and for the evaluation of platelet counts in patients with EDTA-PTCP.

**Registry Numbers**

0 (Antibiotics, Aminoglycoside). 59-01-8 (**Kanamycin**). 60-00-4 (Edetic Acid). 0 (Platelet Aggregation Inhibitors).

**ISSN**

0007-1048

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9803 Revised: 980305. Entry Week: 98054.







8

☐ Citation 141**Unique Identifier**

96045103

**Authors**Elworthy AJ. Edgar R. Moran J. Addy M. Movet R. Kelty E. Wade WG.**Institution**

Department of Periodontology, Dental School, University of Wales College of Medicine, Health Park, Cardiff, UK.

**Title**

A 6-month home-usage trial of 0.1% and 0.2% delmopinol mouthwashes (II). Effects on the plaque microflora.

**Source**

Journal of Clinical Periodontology. 22(7):527-32, 1995 Jul.

**Abbreviated Source**

J Clin Periodontol. 22(7):527-32, 1995 Jul.

**NLM Journal Code**

ht7

**Journal Subset**

D

**Country of Publication**

Denmark

**MeSH Subject Headings**AdolescenceAdultAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Bacteria / de [Drug Effects]Bacteria / ip [Isolation & Purification]Bacteria, Aerobic / de [Drug Effects]Bacteria, Aerobic / ip [Isolation & Purification]Candida / de [Drug Effects]Candida / ip [Isolation & Purification]Colony Count, MicrobialComparative Study\*Dental Plaque / mi [Microbiology]Dextrans / me [Metabolism]Fusobacterium nucleatum / de [Drug Effects]Fusobacterium nucleatum / ip [Isolation & Purification]Gram-Negative Bacteria / de [Drug Effects]Gram-Negative Bacteria / ip [Isolation & Purification]HumanMiddle AgeMorpholines / ad [Administration & Dosage]\*Morpholines / tu [Therapeutic Use]

\*Mouthwashes

\*Oral Hygiene

Prevotella intermedia / de [Drug Effects]

Prevotella intermedia / ip [Isolation & Purification]

Streptococcus / de [Drug Effects]

Streptococcus / ip [Isolation & Purification]

Streptococcus / me [Metabolism]

Surface-Active Agents / ad [Administration & Dosage]

\*Surface-Active Agents / tu [Therapeutic Use]

### Abstract

The effects of 0.1% and 0.2% delmopinol mouthwashes on supragingival plaque flora were investigated in a 6-month home-use study. 141 subjects were studied from whom plaque was collected at baseline, 12, 24, and 36 weeks. Overall, there were no consistent effects on microscopic or total counts. However, there was a significant reduction in the proportion of dextran-producing streptococci in the active groups compared to the control group throughout treatment. There was no colonisation by Candida or Gram-negative aerobic bacilli in the active groups nor was there any decrease in susceptibility to delmopinol. Delmopinol appears to mediate its anti-plaque effect without causing a major shift in bacterial populations, although dextran-producing bacteria appear to be affected, which may have relevance to this agent's mode of action.

### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Morpholines). 0 (Mouthwashes). 0 (Surface-Active Agents). 79874-76-3 (delmopinol). 9004-54-0 (Dextrans).

### ISSN

0303-6979

### Publication Type

Journal Article.

### Language

English

### Entry Month

9601.



☐ Citation 148

3  
9

**Unique Identifier**

95266371

**Authors**Hansson C. Faergemann J.**Institution**Department of Dermatology, Sahlgrens' Hospital, University of Goteborg,  
Sweden.**Title**

The effect of antiseptic solutions on microorganisms in venous leg ulcers.

**Source**

Acta Dermato-Venereologica. 75(1):31-3, 1995 Jan.

**Abbreviated Source**

Acta Derm Venereol. 75(1):31-3, 1995 Jan.

**NLM Journal Code**

0mq

**Country of Publication**

Norway

**MeSH Subject Headings**Acetic Acids / ad [Administration & Dosage]Acetic Acids / tu [Therapeutic Use]Administration, CutaneousAgedAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Bacteria / de [Drug Effects]BandagesChloramines / ad [Administration & Dosage]Chloramines / tu [Therapeutic Use]Colony Count, MicrobialFemaleHumanMalePotassium Permanganate / ad [Administration & Dosage]Potassium Permanganate / tu [Therapeutic Use]Proteus / de [Drug Effects]Proteus / ip [Isolation & Purification]Pseudomonas / de [Drug Effects]Pseudomonas / ip [Isolation & Purification]Staphylococcus aureus / de [Drug Effects]Staphylococcus aureus / ip [Isolation & Purification]Staphylococcus epidermidis / de [Drug Effects]Staphylococcus epidermidis / ip [Isolation & Purification]Streptococcus / de [Drug Effects]

Streptococcus / ip [Isolation & Purification]

Support, Non-U.S. Gov't

Tartrates / ad [Administration & Dosage]

Tartrates / tu [Therapeutic Use]

\*Varicose Ulcer / mi [Microbiology]

\*Varicose Ulcer / th [Therapy]

### Abstract

The effect on the microbial ulcer flora of wet gauze dressings soaked in antiseptic solutions used for desloughing leg ulcers is not known. Quantitative cultures were therefore performed in 45 venous leg ulcers, before application and after 15 minutes' treatment with gauze dressings with four different antiseptic solutions: aluminium acetotartrate (Alsol) 1%, potassium permanganate 0.015%, acetic acid 0.25% and chloramine 0.25%. The percentage of ulcers with each type of microorganism did not differ before and after application of the antiseptic solutions. Staphylococcus aureus was found in 79% of the ulcers, gram-negative rods in 39%, S. epidermidis in 21%, Proteus spp in 21%, Pseudomonas spp in 14% and fungi in none. Potassium permanganate reduced the mean number of bacteria per ulcer from  $4.4 \times 10(6)$  to  $0.9 \times 10(6)$  (ns), chloramine from  $2.7 \times 10(6)$  to  $2.2 \times 10(6)$  (ns), Alsol from  $1.2 \times 10(7)$  to  $3.5 \times 10(6)$  (ns) and acetic acid from  $6.3 \times 10(6)$  to  $2.6 \times 10(5)$  ( $p = 0.007$ ). S. aureus was reduced by acetic acid ( $p = 0.002$ ), gram-negative rods by both chloramine ( $p = 0.03$ ) and acetic acid ( $p = 0.03$ ). The number of Pseudomonas, Proteus, S. epidermidis and Streptococcus haemolyticus group G was not reduced significantly ( $p > 0.05$ ) by any of the solutions.

### Registry Numbers

0 (acetotartaric acid). 0 (Acetic Acids). 0 (Anti-Infective Agents, Local). 0 (Chloramines). 0 (Tartrates). 10599-90-3 (chloramine). 7722-64-7 (Potassium Permanganate).

### ISSN

0001-5555

### Publication Type

Journal Article.

### Language

English

### Entry Month

9508.



☐ Citation 129**Unique Identifier**

96143521

**Authors**Binney A. Addy M. McKeown S. Everatt L.**Institution**

Department of Oral and Dental Science, University of Bristol, England.

**Title**

The effect of a commercially available triclosan-containing toothpaste compared to a sodium-fluoride-containing toothpaste and a chlorhexidine rinse on 4-day plaque regrowth.

**Source**

Journal of Clinical Periodontology. 22(11):830-4, 1995 Nov.

**Abbreviated Source**

J Clin Periodontol. 22(11):830-4, 1995 Nov.

**NLM Journal Code**

ht7

**Journal Subset**

D

**Country of Publication**

Denmark

**MeSH Subject Headings**AdolescenceAdultAnti-Infective Agents,Local / ad [Administration & Dosage]Anti-Infective Agents,Local / ae [Adverse Effects]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Chlorhexidine / ad [Administration & Dosage]Chlorhexidine / ae [Adverse Effects]\*Chlorhexidine / tu [Therapeutic Use]Comparative StudyCross-Over StudiesDental Plaque / pa [Pathology]\*Dental Plaque / pc [Prevention & Control]Dental Plaque IndexFemaleHumanMale\*MouthwashesSingle-Blind MethodSodium ChlorideSodium Fluoride / ad [Administration & Dosage]Sodium Fluoride / ae [Adverse Effects]\*Sodium Fluoride / tu [Therapeutic Use]

Support, Non-U.S. Gov't

\*Toothpaste

Triclosan / ad [Administration & Dosage]

Triclosan / ae [Adverse Effects]

\*Triclosan / tu [Therapeutic Use]

### Abstract

Many compounds could be added to toothpaste to assist plaque inhibition, but ionic interactions can cause formulation difficulties. Moreover, the actual chemical action of a plaque inhibitory agent added to a toothpaste is difficult to assess when the product is used in the conventional manner, i.e., in addition to toothbrushing. The non-ionic antimicrobial triclosan has been incorporated in toothpastes and shown to have variable plaque inhibitory activity both alone and in conjunction with certain polymers or metal ions. Little is known of the efficacy of triclosan toothpastes compared to conventional fluoride toothpastes. The aim of this study was to compare a commercially available toothpaste containing 0.3% triclosan/co-polymer with a sodium fluoride toothpaste for chemical plaque inhibitory effects over a 4-day period. The study was designed to stratify the relative efficacy plaque inhibitory action of the products, comparisons were made with a positive control, chlorhexidine rinse and a negative control, saline. The study design was a randomised single blind crossover design balanced for first-order carryover. A total of 18 healthy, dentate volunteers participated in the study. On day 1 of each period the volunteers suspended toothcleaning and rinsed 2 x daily with the allocated mouthrinse or toothpaste slurry. On day 5, the plaque on the teeth was disclosed and scored by index and area. Increasing plaque scores were in the order chlorhexidine, triclosan toothpaste, fluoride toothpaste, and saline. Chlorhexidine was significantly more effective than all the other agents tested, and both toothpaste preparations were significantly better than the saline rinse. There was no significant difference between the two toothpaste rinses. Consistent with other studies the triclosan toothpaste offers only moderate plaque inhibitory properties when compared to a conventional toothpaste.

### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Mouthwashes). 0 (Toothpaste). 3380-34-5 (Triclosan). 55-56-1 (Chlorhexidine). 7647-14-5 (Sodium Chloride). 7681-49-4 (Sodium Fluoride).

### ISSN

0303-6979

### Publication Type

Clinical Trial. Journal Article. Randomized Controlled Trial.

### Language

English

### Entry Month

9604.



☐ Citation 133**Unique Identifier**

96087602

**Authors**Kaye ET. Kaye KM.**Institution**

Harvard Medical School, Boston, Massachusetts, USA.

**Title**

Topical antibacterial agents. [Review] [58 refs]

**Source**

Infectious Disease Clinics of North America. 9(3):547-59, 1995 Sep.

**Abbreviated Source**

Infect Dis Clin North Am. 9(3):547-59, 1995 Sep.

**NLM Journal Code**

idc

**Country of Publication**

United States

**MeSH Subject Headings**Acne Vulgaris / dt [Drug Therapy]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Bacterial Infections / pc [Prevention & Control]Burns / co [Complications]Catheterization / ae [Adverse Effects]HumanPyoderma / dt [Drug Therapy]Wound Infection / pc [Prevention & Control]**Abstract**

Topical antibacterial agents offer a useful alternative to systemic agents in certain circumstances. Uses include prophylaxis of infection for burns, traumatic wounds, and intravascular catheters, as well as eradication of *S. aureus* nasal carriage and treatment of primary and secondary pyodermas. Evidence supporting the use of topical agents for prophylaxis and treatment of skin and superficial wound infections and the indications for use of specific antimicrobials have been reviewed. Although topical agents are widely used, in many instances, data supporting their efficacy are only beginning to emerge. [References: 58]

**Registry Numbers**

0 (Anti-Infective Agents, Local).

**ISSN**

0891-5520

**Publication Type**

Journal Article. Review. Review, Tutorial.

**Language**

English

**Entry Month**

9603.

☐ Citation 146**Unique Identifier**

95403537

**Authors**Demling RH.**Institution**

Brigham and Women's Hospital, Boston, Massachusetts, USA.

**Title**

Use of Biobrane in management of scalds.

**Source**

Journal of Burn Care &amp; Rehabilitation. 16(3 Pt 1):329-30, 1995 May-Jun.

**Abbreviated Source**

J Burn Care Rehabil. 16(3 Pt 1):329-30, 1995 May-Jun.

**NLM Journal Code**

hlk

**Journal Subset**

N

**Country of Publication**

United States

**MeSH Subject Headings**\*Anti-Infective Agents,Local / tu [Therapeutic Use]Biocompatible Materials / ec [Economics]\*Biocompatible Materials / tu [Therapeutic Use]Burns / et [Etiology]Burns / pp [Physiopathology]\*Burns / th [Therapy]ChildChild, PreschoolHumanLength of Stay\*Occlusive Dressings\*Phenols / tu [Therapeutic Use]Treatment OutcomeWound Healing / ph [Physiology]**Abstract**

A scald burn is a superficial to mid second-degree burn with a viable dermis beneath the blisters and a good blood flow. However, the burn may be incapacitating because of pain and fluid and heat loss. Biobrane adheres very well to this depth of burn and mechanically and biochemically closes the wound. We have used Biobrane on scald burns for the last 5 years and have found it to be an excellent method of treating superficial second-degree burns.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Biobrane). 0 (Biocompatible Materials). 0 (Phenols). 118-79-6 (2,4,6-tribromophenol).

**ISSN**

0273-8481



☐ Citation 3**Unique Identifier**

97478090

**Authors**Sheng WD. Jiddawi MS. Hong XQ. Abdulla SM.**Institution**

Jiang Yin Peoples Hospital, Jiangsu, China.

**Title**Treatment of chloroquine-resistant malaria using pyrimethamine in combination with **berberine**, tetracycline or cotrimoxazole.**Source**

East African Medical Journal. 74(5):283-4, 1997 May.

**Abbreviated Source**

East Afr Med J. 74(5):283-4, 1997 May.

**NLM Journal Code**

edg

**Country of Publication**

Kenya

**MeSH Subject Headings**AdolescenceAdultAged\*Antibiotics, Tetracycline / tu [Therapeutic Use]\*Antimalarials / tu [Therapeutic Use]\***Berberine** / tu [Therapeutic Use]ChildChild, Preschool\*ChloroquineComparative StudyDrug ResistanceDrug Therapy, CombinationFemaleHumanInfant\*Malaria, Falciparum / dt [Drug Therapy]Malaria, Falciparum / ps [Parasitology]MaleMiddle AgeProspective Studies\*Pyrimethamine / tu [Therapeutic Use]\*Tetracycline / tu [Therapeutic Use]\*Trimethoprim-Sulfamethoxazole Combination / tu [Therapeutic Use]**Abstract**

Two hundred and fifteen patients with chloroquine-resistant malaria were randomised into three groups. The first group of 82 patients were given pyrimethamine and **berberine** (**berberine** group), the second group of 64 patients, pyrimethamine and tetracycline (tetracycline group) and the third

group of 69 patients were given pyrimethamine and cotrimoxazole (cotrimoxazole group). In the **berberine** group, the clearance, rate of asexual parasitaemia was 74.4% after treatment, while in the tetracycline group it was 67.2% and in the cotrimoxazole group 47.8%. These results indicate that **berberine** is more effective in clearing the parasite than both tetracycline and cotrimoxazole, and that the combination of pyrimethamine and **berberine** gives the best results for chloroquine resistant malaria.

**Registry Numbers**

0 (Antibiotics, Tetracycline). 0 (Antimalarials). 2086-83-1 (**Berberine**). 54-05-7 (Chloroquine). 58-14-0 (Pyrimethamine). 60-54-8 (Tetracycline). 8064-90-2 (Trimethoprim-Sulfamethoxazole Combination).

**ISSN**

0012-835X

**Publication Type**

Clinical Trial. Journal Article. Randomized Controlled Trial.

**Language**

English

**Entry Month**

9801.



☐ Citation 60**Unique Identifier**

97297352

**Authors**Wilson AP. Lewis C. O'Sullivan H. Shetty N. Neild GH. Mansell M.**Institution**

Department of Clinical Microbiology, University College London Hospitals, UK.

**Title**

The use of povidone iodine in exit site care for patients undergoing continuous peritoneal dialysis (CAPD).

**Source**

Journal of Hospital Infection. 35(4):287-93, 1997 Apr.

**Abbreviated Source**

J Hosp Infect. 35(4):287-93, 1997 Apr.

**NLM Journal Code**

id6

**Country of Publication**

England

**MeSH Subject Headings**AgedAged, 80 and over\*Anti-Infective Agents,Local / tu [Therapeutic Use]Catheterization / ae [Adverse Effects]Catheterization / mt [Methods]FemaleHumanInfection Control / mt [Methods]MaleMiddle AgePeritoneal Dialysis, Continuous Ambulatory / ae [Adverse Effects]\*Peritoneal Dialysis, Continuous Ambulatory / mt [Methods]\*Povidone-Iodine / tu [Therapeutic Use]Pseudomonas Infections / pc [Prevention & Control]Staphylococcal Infections / pc [Prevention & Control]**Abstract**

Exit site infection is a major risk factor for the development of peritonitis in continuous ambulatory peritoneal dialysis. The frequency of infection can be reduced by scrupulous exit site care with or without topical antiseptics. A randomized trial was performed of 149 catheters in 130 patients to assess any additional benefits conferred by the use of povidine iodine dry powder spray at dressing changes over an existing strict protocol of exit care. Exit infections occurred in 14 (18%) of 77 patients using spray and in 15 (21%) of 72 patients not using spray. The risk of peritonitis was also similar in each group. The proportion of infections caused by *Staphylococcus aureus* was reduced in the spray group, but those caused by *Pseudomonas aeruginosa* were increased. Rash occurred in 6% of those using the spray. The use of the spray did not therefore seem justified.

**Registry Numbers**

☐ Citation 39**Unique Identifier**

97257661

**Authors**Williams C.**Institution**

Maelor Hospital, Wrexham, North Wales.

**Title**

Arglaes controlled release dressing in the control of bacteria.

**Source**

British Journal of Nursing. 6(2):114-5, 1997 Jan 23-Feb 12.

**Abbreviated Source**

Br J Nurs. 6(2):114-5, 1997 Jan 23-Feb 12.

**NLM Journal Code**

big

**Journal Subset**

N

**Country of Publication**

England

**MeSH Subject Headings**\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Bacterial Infections / nu [Nursing]Delayed-Action PreparationsHuman\*Occlusive Dressings\*Silver Nitrate / tu [Therapeutic Use]\*Wound Infection / nu [Nursing]**Abstract**

It has been known for many years that silver has antimicrobial properties. Arglaes is a film dressing that provides a continuous and controlled release of silver ions and is produced by Maersk Medical. The name is derived from argentum, which is Latin for silver, and Ag, the chemical symbol for silver. Since the emergence of resistant organisms, topical antibiotics are best avoided. Arglaes has been developed in the light of this and appears to control the bacteria in wounds and prevent bacterial contamination. Arglaes also provides a moist environment for the healing process and is suitable for many wound types.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Delayed-Action Preparations). 7761-88-8 (Silver Nitrate).

**ISSN**

0966-0461

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9706.

*Silver ions*

☐ Citation 23**Unique Identifier**

98066983

**Authors**Pierard GE. Pierard-Franchimont C. Arrese JE.**Institution**Belgian SSTC Research Center, Département of Dermatopathology, CHU Sart  
Tilman, Liege, Belgium.**Title**

Povidone-iodine wash solutions in the prevention of superficial fungal infections; predictive evaluation using the corneofungimetry bioassay.

**Source**

European Journal of Clinical Pharmacology. 53(2):101-4, 1997.

**Abbreviated Source**

Eur J Clin Pharmacol. 53(2):101-4, 1997.

**NLM Journal Code**

en4

**Country of Publication**

Germany

**MeSH Subject Headings**\*Anti-Infective Agents,Local / tu [Therapeutic Use]Biological Assay / mt [Methods]Comparative Study\*Dermatomycoses / pc [Prevention & Control]Dose-Response Relationship, DrugDrug Screening / mt [Methods]\*Fungi / de [Drug Effects]HumanMicrobial Sensitivity Tests\*Povidone-Iodine / tu [Therapeutic Use]Skin TestsSpecies Specificity**Abstract**

**OBJECTIVE:** Prevention of superficial mycoses remains a stubborn problem. The effect of antiseptics for that purpose is largely unknown. We studied the potential fungitoxic activity of povidone iodine (PVP-I) contained in wash solutions.

**METHODS:** The corneofungimetry bioassay was conducted using PVP-I at 1.33%, 2.5%, 4% and 7.5% as test products and four target fungi, namely *Candida albicans*, *Trichophyton rubrum*, *T. mentagrophytes*, var. *interdigitale* (20 strains) and *Microsporum canis*.

**RESULTS:** Data show that PVP-I limits fungal growth on stratum corneum. Different species and strains of fungi are not similarly affected. There also exists a diversity of individual susceptibility of the stratum corneum to promote germination of yeasts and arthroconidia.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 25655-41-8 (Povidone-Iodine).

**ISSN**

☐ Citation 16**Unique Identifier**

98066953

**Authors**Lanker Klossner B. Widmer HR. Frey F.**Institution**Department of Internal Medicine, Nephrology, University Hospital of Berne,  
Switzerland.**Title**

Nondevelopment of resistance by bacteria during hospital use of povidone-iodine.

**Source**

Dermatology. 195 Suppl 2:10-3, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:10-3, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Bacterial Typing TechniquesCatheters, Indwelling / ae [Adverse Effects]Colony Count, MicrobialDisinfectants / ad [Administration & Dosage]Disinfectants / tu [Therapeutic Use]Drug Resistance, MicrobialFemaleHumanIodophors / ad [Administration & Dosage]\*Iodophors / tu [Therapeutic Use]MaleNephelometry and TurbidimetryPeritoneal Dialysis, Continuous Ambulatory / ae [Adverse Effects]Peritoneal Dialysis, Continuous Ambulatory / is [Instrumentation]Peritonitis / dt [Drug Therapy]\*Peritonitis / mi [Microbiology]Plasmids / de [Drug Effects]Povidone-Iodine / ad [Administration & Dosage]\*Povidone-Iodine / tu [Therapeutic Use]Sodium Hypochlorite / ad [Administration & Dosage]Sodium Hypochlorite / tu [Therapeutic Use]\*Staphylococcal Infections / dt [Drug Therapy]Staphylococcus / cl [Classification]

\*Staphylococcus / de [Drug Effects]

Staphylococcus / gd [Growth & Development]

Time Factors

### Abstract

Since the bacterial ability to develop resistance against various factors of their surroundings is a well-known phenomenon, resistance against iodine and specifically against povidone-iodine (PVP-I) has been widely investigated. Yet there is little known about bacterial resistance in long-term daily use of disinfectants in continuous ambulatory peritoneal dialysis (CAPD) patients. The aim of our study was to investigate whether on daily use of PVP-I over a period of at least 6 months coagulase-negative staphylococci (CNS)--the predominant infective organisms of peritonitis--developed resistance against PVP-I. At the catheter exit site of 40 CAPD patients we isolated 36 CNS. 23 CNS (CNS + PVP) originate from patients using PVP-I, 13 CNS (CNS + CI) from patients using sodium hypochlorite (NaOCl) as disinfectant. The strains were biotyped, antibiotic resistance patterns were determined and resistance against PVP-I or NaOCl was calculated as reduction factor using the quantitative suspension test combined with a turbidimetric standardization. Resistance against PVP-I 0.01% and against NaOCl 0.005% was determined at two contact times (30 and 300 s) for each patient group. In addition, we investigated the effects of plasmid loss on sensitivity to PVP-I. Out of 5 multiple-antibiotic-resistant CNS, 3 strains showed no difference in reduction factor against PVP-I before and after curing. There was no significant difference in reduction factor against NaOCl. CNS + PVP were even significantly more sensitive to PVP-I than CNS + CI. Taken together, our results demonstrate that long-term use of PVP-I does not cause any bacterial resistance in CNS of CAPD patients.

### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Disinfectants). 0 (Iodophors). 0 (Plasmids). 25655-41-8 (Povidone-Iodine). 7681-52-9 (Sodium Hypochlorite).

### ISSN

1018-8665

### Publication Type

Journal Article.

### Language

English

### Entry Month

9805. Entry Week: 98051.



☐ Citation 15**Unique Identifier**

98066971

**Authors**Arata T. Kamitani M. Miyai T. Ito M.**Institution**

Surgical Center, Okayama University Hospital, Japan.

**Title**

Antiseptic effects at injection sites.

**Source**

Dermatology. 195 Suppl 2:107-10, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:107-10, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Antisepsis\*Bacteria / de [Drug Effects]Bacteria / gd [Growth & Development]Bacterial Infections / pc [Prevention & Control]ChemopreventionChlorhexidine / ad [Administration & Dosage]Chlorhexidine / tu [Therapeutic Use]Colony Count, MicrobialComparative StudyCross-Over StudiesEthanol / ad [Administration & Dosage]Ethanol / tu [Therapeutic Use]HumanInjections / ae [Adverse Effects]Iodophors / ad [Administration & Dosage]\*Iodophors / tu [Therapeutic Use]Povidone-Iodine / ad [Administration & Dosage]\*Povidone-Iodine / tu [Therapeutic Use]\*Skin / mi [Microbiology]**Abstract**

To our knowledge, there are no published papers detailing antisepsis for injection sites. In view of this, the efficacies of povidone-iodine (PVP-I) ethanol solution and chlorhexidine (CH) ethanol, the agents most commonly used for antisepsis of the operative field, were compared. Before and after the injection site was disinfected with either of these antiseptics, specimens of indigenous bacteria on



the skin were collected by the cylinder scrub method, and the bacteria reduction rate and the reduction factor (RF) were determined to evaluate the efficacy of antiseptics. The bacteria reduction rate and RF value obtained for PVP-I ethanol were 95.1 +/- 11.2 and 2.1 +/- 0.9% and those for CH ethanol were 93.5 +/- 9.3 and 1.8 +/- 0.9%. Since there were individual differences in cell count before antiseptics, no significant difference was seen in bactericidal activity. However, slightly more favorable results were obtained with PVP-I ethanol. Although it is impossible to eradicate completely the indigenous microbes with currently available methods, it is considered important for the prevention of infection of the injection site to decrease bacterial counts as much as possible.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Iodophors). 25655-41-8 (Povidone-Iodine). 55-56-1 (Chlorhexidine). 64-17-5 (Ethanol).

**ISSN**

1018-8665

**Publication Type**

Clinical Trial. Journal Article.

**Language**

English

**Entry Month**

9805. Entry Week: 98051.



☐ Citation 9**Unique Identifier**

98066961

**Authors**Rahn R. Adamietz IA. Boettcher HD. Schaefer V. Reimer K. Fleischer W.**Institution**Department of Dentistry, Klinikum der J.W.-Goethe-Universitat,  
Frankfurt/Main, Germany.**Title**

Povidone-iodine to prevent mucositis in patients during antineoplastic radiochemotherapy.

**Source**

Dermatology. 195 Suppl 2:57-61, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:57-61, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**AdultAgedAged, 80 and overAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Antibiotics, Antifungal / ad [Administration & Dosage]Antibiotics, Antifungal / tu [Therapeutic Use]\*Antineoplastic Agents, Combined / ae [Adverse Effects]Area Under CurveChemopreventionCombined Modality TherapyFemaleFollow-Up StudiesHead and Neck Neoplasms / dt [Drug Therapy]\*Head and Neck Neoplasms / rt [Radiotherapy]HumanImmunization, PassiveIncidenceIodophors / ad [Administration & Dosage]\*Iodophors / tu [Therapeutic Use]MaleMiddle AgeMouthwashes / tu [Therapeutic Use]Nystatin / ad [Administration & Dosage]Nystatin / tu [Therapeutic Use]

Pantothenic Acid / aa [Analog & Derivatives]  
Pantothenic Acid / ad [Administration & Dosage]  
Pantothenic Acid / tu [Therapeutic Use]  
Povidone-Iodine / ad [Administration & Dosage]  
\*Povidone-Iodine / tu [Therapeutic Use]  
Radiotherapy / ae [Adverse Effects]  
Rutin / aa [Analog & Derivatives]  
Rutin / tu [Therapeutic Use]  
Stomatitis / ci [Chemically Induced]  
Stomatitis / et [Etiology]  
\*Stomatitis / pc [Prevention & Control]  
Time Factors  
Vasodilator Agents / tu [Therapeutic Use]

### Abstract

In an open study, the efficacy of povidone-iodine in the prophylaxis of mucositis during antineoplastic radiochemotherapy was determined. 40 patients were randomly assigned to a treatment or control group (each 20 patients). All patients received standard prophylaxis of mucositis with nystatin, dexpantenol, rutoside and immunoglobulin. In addition, the patients of the treatment group performed 4 times daily rinsing with povidone-iodine, the control patients with sterile water. Clinical examination of the oral mucosa was performed weekly during the radiation period and up to 6 weeks after the end of therapy. Oral mucositis was observed in 14 patients of the treatment group (mean grading: 1.0) and in all 20 patients of the control group (mean grading: 3.0). The mean onset of mucositis was after 2.25 weeks in treatment patients and 1.5 weeks in control patients. The mean total duration of mucositis was 2.75 weeks in treatment patients and 9.25 weeks in control patients. The mean AUC values were 2.5 in treatment patients and 15.75 in control patients. All findings were statistically significantly different between the two groups. It is concluded that rinsing with povidone-iodine reduces the incidence, severity and duration of oral mucositis during antineoplastic radiochemotherapy.

### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Antibiotics, Antifungal). 0 (Antineoplastic Agents, Combined). 0 (Iodophors). 0 (Mouthwashes). 0 (Vasodilator Agents). 108916-86-5 (rutin sulfate). 1400-61-9 (Nystatin). 153-18-4 (Rutin). 25655-41-8 (Povidone-Iodine). 62507-76-0 (dexpantenol). 79-83-4 (Pantothenic Acid).

### ISSN

1018-8665

### Publication Type

Clinical Trial. Journal Article. Randomized Controlled Trial.

### Language

English

### Entry Month

9805. Entry Week: 98051.



☐ Citation 8**Unique Identifier**

98066962

**Authors**

Sugimoto K. Kuroki H. Kanazawa M. Kurosaki T. Abe H. Takahashi Y. Ishiwada N. Nezu Y.  
Hoshioka A. Toba T.

**Institution**

Department of Pediatrics, Chiba Municipal Hospital, Japan.

**Title**

New successful treatment with disinfectant for atopic dermatitis.

**Source**

Dermatology. 195 Suppl 2:62-8, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:62-8, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**AdolescenceAdultAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Child\*Dermatitis, Atopic / dt [Drug Therapy]Dermatitis, Atopic / im [Immunology]Dermatitis, Atopic / mi [Microbiology]Emollients / tu [Therapeutic Use]FemaleGlucocorticoids, Topical / tu [Therapeutic Use]HumanIgE / an [Analysis]Iodine / an [Analysis]Iodophors / ad [Administration & Dosage]\*Iodophors / tu [Therapeutic Use]MaleMedicine, TraditionalMethicillin ResistancePatient SatisfactionPetrolatum / tu [Therapeutic Use]Povidone-Iodine / ad [Administration & Dosage]\*Povidone-Iodine / tu [Therapeutic Use]QuestionnairesReagents / an [Analysis]*10% Povidone - iodine*

Remission InductionStaphylococcal Skin Infections / dt [Drug Therapy]Staphylococcal Skin Infections / im [Immunology]Staphylococcus aureus / im [Immunology]Staphylococcus aureus / ip [Isolation & Purification]Thyroid Gland / de [Drug Effects]Thyrotropin / an [Analysis]Thyroxine / an [Analysis]Triiodothyronine / an [Analysis]**Abstract**

For the treatment of atopic dermatitis, a variety of therapies are used including folk medicine. At present, there is no single treatment which is effective to cure the symptoms of atopic dermatitis completely in all patients. We are drawing attention to the high isolation rate of Staphylococcus aureus when starting disinfectant treatment combined with topical steroid therapies for the purpose of killing S. aureus. As a result, we examined many patients in whom almost a complete remission was obtained even after short periods of therapy, though it had been difficult to obtain improvement by conventional treatments. In many patients, IgE values and reagin antibody titer decrease dramatically soon after starting treatment. As a disinfectant, 10% povidone-iodine solution was used. We investigated also the effect of iodine contained in the povidone-iodine solution on the thyroid gland.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Emollients). 0 (Glucocorticoids, Topical). 0 (Iodophors). 0 (Reagents). 25655-41-8 (Povidone-Iodine). 37341-29-0 (IgE). 6893-02-3 (Triiodothyronine). 7488-70-2 (Thyroxine). 7553-56-2 (Iodine). 8009-03-8 (Petrolatum). 9002-71-5 (Thyrotropin).

**ISSN**

1018-8665

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9805. Entry Week: 98051.



☐ Citation 6**Unique Identifier**

98066964

**Authors**Matsumoto T. Sakumoto M. Takahashi K. Kumazawa J.**Institution**

Department of Urology, School of Medicine, University of Occupational and Environmental Health, Kitakyushu, Japan.

**Title**

Prevention of catheter-associated urinary tract infection by meatal disinfection.

**Source**

Dermatology. 195 Suppl 2:73-7, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:73-7, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]AntisepsisBacteria / de [Drug Effects]Bacteria / gd [Growth & Development]Bacteriuria / mi [Microbiology]Bacteriuria / ur [Urine]Burkholderia / de [Drug Effects]\*Catheters, Indwelling / ae [Adverse Effects]ChemopreventionColony Count, MicrobialEnterobacteriaceae / de [Drug Effects]Enterobacteriaceae / gd [Growth & Development]Enterobacteriaceae Infections / pc [Prevention & Control]Enterococcus / de [Drug Effects]Enterococcus / gd [Growth & Development]FemaleGram-Positive Bacterial Infections / pc [Prevention & Control]HumanIncidence\*Iodophors / tu [Therapeutic Use]MalePostoperative CarePovidone-Iodine / ad [Administration & Dosage]\*Povidone-Iodine / tu [Therapeutic Use]*Povidone-iodine*

Sex FactorsStaphylococcal Infections / pc [Prevention & Control]Staphylococcus / de [Drug Effects]Staphylococcus / gd [Growth & Development]\*Urethra / de [Drug Effects]Urethra / mi [Microbiology]Urinary Catheterization / ae [Adverse Effects]\*Urinary Catheterization / is [Instrumentation]\*Urinary Tract Infections / pc [Prevention & Control]**Abstract**

The incidence of catheter-associated urinary tract infections (UTIs) becomes higher with prolongation of the indwelling period of a catheter. As to the entry of bacteria, ascending UTIs have now attracted attention. In the present study, the meatal area was examined bacteriologically and the possibility to use antiseptics for blocking the route of developing infections was investigated. The subjects included 72 patients with an indwelling, urethral catheter inserted post-operatively. These patients were divided into three groups treated with once or twice daily application of povidone-iodine or once daily application of povidone-iodine cream. In these groups, the relation between changes in isolation of bacteria from the meatal area and the incidence of UTI was evaluated. It was found that reduction in bacterial count by antiseptics is effective to prevent ascending UTIs. Moreover, once daily application of povidone-iodine was proven to be effective in male patients. The effective antiseptics in females was twice daily application of povidone-iodine.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Iodophors). 25655-41-8 (Povidone-Iodine).

**ISSN**

1018-8665

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9805. Entry Week: 98051.



☐ Citation 5**Unique Identifier**

98066965

**Authors**Shindo K.**Institution**

First Department of Surgery, Kinki University, Osaka, Japan.

**Title**

Antiseptic effect of povidone-iodine solution on abdominal skin during surgery and on thyroid-gland-related substances.

**Source**

Dermatology. 195 Suppl 2:78-84, 1997.

**Abbreviated Source**

Dermatology. 195 Suppl 2:78-84, 1997.

**NLM Journal Code**

bbv

**Country of Publication**

Switzerland

**MeSH Subject Headings**Abdomen / mi [Microbiology]\*Abdomen / su [Surgery]Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]AntisepsisBacteria / de [Drug Effects]Bacteria / gd [Growth & Development]Colony Count, MicrobialComparative StudyFemaleHuman\*Intraoperative CareIodine / bl [Blood]Iodophors / ad [Administration & Dosage]\*Iodophors / tu [Therapeutic Use]MalePovidone-Iodine / ad [Administration & Dosage]\*Povidone-Iodine / tu [Therapeutic Use]SafetySkin / mi [Microbiology]\*Skin / su [Surgery]\*Thyroid Gland / de [Drug Effects]Thyrotropin / bl [Blood]Thyroxine / bl [Blood]Time Factors



Triiodothyronine / bl [Blood]**Abstract**

No definite guidelines have been published concerning the suitable exposure time and frequency of skin antisepsis of the operative field. In the present study, the antiseptic effect of a single use (single-application group) of 10% povidoneiodine solution for skin antisepsis was compared with its triple use (triple-application group). The exposure time was 2 min for both groups. Moreover, the effects on blood levels of total iodine and thyroid-gland-related substances were evaluated. High antiseptic efficacy was obtained in both groups, indicating that our antiseptic method to disinfect the operative field is effective. Slightly better results were obtained from the triple-application group, although the difference was not statistically significant. Blood levels of total iodine and thyroid-gland-related substances remained within the normal range in all cases. However, in cases receiving a large amount of 10% povidone-iodine solution a transient elevation in blood total iodine was observed. Thus, the 10% povidone-iodine solution is considered to be safe and effective for skin antisepsis of the operative field when applied repeatedly in a small amount per dose with an exposure time of about 2 min.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Iodophors). 25655-41-8 (Povidone-Iodine). 6893-02-3 (Triiodothyronine). 7488-70-2 (Thyroxine). 7553-56-2 (Iodine). 9002-71-5 (Thyrotropin).

**ISSN**

1018-8665

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9805. Entry Week: 98051.



☐ Citation 3**Unique Identifier**

98134387

**Authors**Burks RJ.**Institution**

Verdugo Hills Hospital, Glendale, CA 91209, USA.

**Title**

Povidone-iodine solution in wound treatment. [Review] [33 refs]

**Source**

Physical Therapy. 78(2):212-8, 1998 Feb.

**Abbreviated Source**

Phys Ther. 78(2):212-8, 1998 Feb.

**NLM Journal Code**

p6w

**Journal Subset**

A

**Country of Publication**

United States

**MeSH Subject Headings**AnimalAnti-Infective Agents,Local / ae [Adverse Effects]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Human\*Povidone-Iodine / tu [Therapeutic Use]\*Wound Healing / de [Drug Effects]Wound Infection / dt [Drug Therapy]\*Wound Infection / pc [Prevention & Control]**Abstract**

Clinicians have used numerous strategies to combat wound infections, including topical and systemic administration of antibiotics, and various antiseptic agents such as hypochlorite (bleach) and hydrogen peroxide have been placed on wounds to kill bacteria or inhibit their growth. A commonly used antimicrobial agent is povidone-iodine (Betadine), a complex of iodine, the bactericidal component, with polyvinylpyrrolidone (povidone), a synthetic polymer. The most common commercial form is a 10% solution in water yielding 1% available iodine. Povidone-iodine is available as a surgical scrub or skin cleanser with a detergent base (0.75% available iodine) or in other forms. Decisions regarding choice of wound treatment involve two basic considerations: (1) how safe is the treatment, and (2) how effective is the treatment. The safety of a wound care treatment may be determined by whether the treatment retards the progress of the wound through the stages of healing (inflammatory, proliferative/reepithelializing, and remodeling). The efficacy of a wound care treatment (e.g., povidone-iodine) can be judged in vitro by its ability to kill microorganisms and in vivo by whether it decreases the rate or severity of wound infection. The task of evaluating the choice of povidone-iodine solution for treatment of wounds, especially the chronic wounds most often seen in physical therapy practice, is made complex by two factors. First,

although there is a large body of research into various aspects of povidone-iodine use in wound care, the results are not always germane to the types of wound treatment most often provided by physical therapists. The relevance of in vitro studies regarding safety and effectiveness to in vivo use with patients may be limited. Much of the published research on wound healing uses animal wound models; however, the applicability of findings in animal studies to human wounds has been questioned. [References: 33]

**Registry Numbers**

0 (Anti-Infective Agents, Local). 25655-41-8 (Povidone-Iodine).

**ISSN**

0031-9023

**Publication Type**

Journal Article. Review. Review, Tutorial.

**Language**

English

**Entry Month**

9805. Entry Week: 98051.



☐ Citation 47

13  
14

**Unique Identifier**

97391307

**Authors**Turcic J. Alfirevic I. Cavcic J. Martinac P. Biocina B.**Institution**

University Department of Surgery, University Hospital Centre, Zagreb, Croatia.

**Title**

Peroxyacetic acid effect on the bacteriologic status of war wound.

**Source**

Acta Medica Croatica. 51(3):159-62, 1997.

**Abbreviated Source**

Acta Med Croatica. 51(3):159-62, 1997.

**NLM Journal Code**

bh2

**Country of Publication**

Croatia

**MeSH Subject Headings**Adult\*Anti-Infective Agents,Local / tu [Therapeutic Use]CroatiaHumanMale\*Peracetic Acid / tu [Therapeutic Use]Saline Solution, Hypertonic / tu [Therapeutic Use]\*WarWound Infection / mi [Microbiology]\*Wound Infection / pc [Prevention & Control]**Abstract**

In this study, the efficiency of peroxyacetic acid as a **local** antiseptic in war wound healing was investigated. Peroxyacetic acid was specially prepared for **local** application. The acidity was reduced from pH 2 to pH 5 using acetate buffer, the concentration was reduced to 0.2% and the use of sulfuric acid was avoided in the peroxyacetic acid preparation. Thirty-five patients with at least two similar wounds requiring daily dressing were included on a voluntary basis. Cranial wounds and wounds on the right side of the body were treated by peroxyacetic acid compresses, while other wounds were treated by the application of hypertonic NaCl solution. On day 12, the wounds treated by peroxyacetic acid ( $\chi^2 = 52$ ;  $df = 4$ ,  $P < 0.001$ ) were observed to be statistically significantly cleansed than the wounds treated conventionally. The use of peroxyacetic acid as a **local** antiseptic has not yet been described in the available literature. The possibilities and efficiency of peroxyacetic acid for this purpose, previously prepared for use in living tissue, are emphasized.

**Registry Numbers**0 (**Anti-Infective Agents, Local**). 0 (Saline Solution, Hypertonic). 79-21-0 (Peracetic Acid).**ISSN**

1330-0164

**antiseptic**-detergents, alcoholic solutions, or unmedicated soap. 70% alcohol, with or without chlorhexidine, was the most effective preparation. The two **antiseptic** detergents showed variable results, but against Gram-negative bacilli neither was significantly more effective than plain soap. Some tests were also made on the death rate of organisms dried on the skin without disinfection.

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Go to ... [Help](#) | [Logoff](#)

### Citation 18

**Unique Identifier**

78161507

**Authors**Uhlig R. Gitt HA. Wildfuhr W.**Title**

[Experimental studies on the antimicrobial effect of several butylcyanoacrylate tissue adhesives]. [German]

**Source**

Zeitschrift fur Experimentelle Chirurgie. 11(1):27-31, 1978.

**Abstract**

It is dealt with the effects of various butylcyano-acrylate type surgical adhesives on gram-positive and gram-negative bacterial species. The experimental results show a growth-inhibiting effect on gram-positive germs. Gram-negative germs are not affected. The growth inhibition produced by SO<sub>2</sub>-containing adhesives is greater than that caused by SO<sub>2</sub>-free ones. As compared to Histoacryl blue, the Fimomed variants showed a broader spectrum. Furthermore, it was stated that the adhesive exerts its growth-inhibiting effect not only in the monomeric, but also in the polymeric state. A relationship between the gram-behaviour and the antimicrobic effect of the adhesive is taken into consideration.

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### Citation 19

**Unique Identifier**

78249709

**Authors**Sansiviero A. Almeida NO.**Title**

[Bactericidal action of modified cavity varnishes--their action against microorganisms found in the human oral cavity (in vitro study)]. [Portuguese]

**Source**

Revista Da Faculdade de Odontologia de Sao Jose Dos Campos. 5(2):43-7, 1976  
Jul-Dec.

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Go to ... [Help](#) | [Logoff](#)

### Citation 20

☐ Citation 125**Unique Identifier**

96169713

**Authors**Bibel DJ. Aly R. Shinefield HR.**Institution**Department of Dermatology, University of California at San Francisco  
94143-0517, USA.**Title**

Topical sphingolipids in antiseptis and antifungal therapy.

**Source**

Clinical &amp; Experimental Dermatology. 20(5):395-400, 1995 Sep.

**Abbreviated Source**

Clin Exp Dermatol. 20(5):395-400, 1995 Sep.

**NLM Journal Code**

ddu

**Country of Publication**

England

**MeSH Subject Headings**Animal\*Anti-Infective Agents,Local / tu [Therapeutic Use]\*Antifungal Agents / tu [Therapeutic Use]Candida albicansDrug ScreeningFemaleGuinea PigsHumanMale\*Skin Diseases, Infectious / dt [Drug Therapy]\*Sphingolipids / tu [Therapeutic Use]Staphylococcus aureusSupport, Non-U.S. Gov't**Abstract**

Sphingosine and sphinganine, free sphingolipids of the stratum corneum, are, in vitro, strongly inhibitory for both bacteria and fungi. Whether or not they are suitable, indeed active, in vivo was examined: (i) on human volunteers, first as a preventative antiseptic against subsequently applied *Staphylococcus aureus* and *Candida albicans*, and second as a restorative antiseptic against the previously expanded normal skin flora; and (ii) on guinea-pigs as therapy for experimental *C. albicans* and *Trichophyton mentagrophytes* infections. In the antiseptic studies, which involved 200 micrograms/cm<sup>2</sup> of sphinganine in ethanol (50 microliters of a 1.6% solution), up to three-log reductions in the population of target micro-organisms were obtained, compared with vehicle and untreated controls ( $P < 0.001$ ). The daily application of sphingosine as 1.5% ethanol-petrolatum ointment was able to diminish inflammation slightly in dermatophyte-infected guinea-pigs ( $P = 0.02-0.05$ ), although the animals remained culture positive over the 3-week sampling period. The candida infections, treated daily with 1.5% sphinganine in ethanol, showed no improvement in

inflammation compared with controls, except for 2 days of the 2-week observation period ( $P = 0.01-0.03$ ); however, by the fourth day of therapy the yeast was eliminated in 75% of animals. No gross toxicity was observed among animals or human volunteers. These experiments further support simple sphingolipids as important antimicrobial agents of the cutaneous barrier and point toward a new biochemical approach in treating infectious disease.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Antifungal Agents). 0 (Sphingolipids).

**ISSN**

0307-6938

**Publication Type**

Clinical Trial. Controlled Clinical Trial. Journal Article.

**Language**

English

**Entry Month**

9606.





# **EXHIBIT 3**



EDTA

Complete record☐ Citation 4**Unique Identifier**

96177051

**Authors**Yoshida T. Shibata T. Shinohara T. Gomyo S. Sekine I.**Institution**

Department of Endodontics, School of Dentistry, Asahi University, Gifu, Japan.

**Title**Clinical evaluation of the efficacy of **EDTA** solution as an endodontic irrigant.**Source**

Journal of Endodontics. 21(12):592-3, 1995 Dec.

**Abstract**

The effect of eliminating the smear layer by means of 15% **EDTA** solution as a root canal irrigant was studied in 189 single-rooted infected teeth. Each tooth was treated at two appointments, and the root canal bacteriological examination was studied on the first (pretreatment, and after enlargement and irrigation) and second (pretreatment) visits. The root canals were irrigated with 15% **EDTA** solution with ultrasonics agitation. No antibacterial intracanal medications were used between the appointment. When 15% **EDTA** solution was used, no bacteria could be recovered from 93 of 129 root canals at the sampling stage on second visit. No bacteria were found in 21 of 60 root canals when saline solution was used as an irrigant. These results suggest that 15% **EDTA** solution is more effective than saline solution as a root canal irrigant.



*Catheter flush*Complete record☐ Citation 1**Unique Identifier**

96197216

**Authors**Daghistani D. Horn M. Rodriguez Z. Schoenike S. Toledano S.**Institution**

Department of Pediatrics, University of Miami/Jackson Memorial Medical Center, Miami, Florida 33101, USA.

**Title**Prevention of indwelling central venous **catheter** sepsis [see comments].**Comments**

Comment in: Med Pediatr Oncol 1998 Jan;30(1):73-4

**Source**

Medical &amp; Pediatric Oncology. 26(6):405-8, 1996 Jun.

**Abstract**

In an attempt to decrease the incidence of central venous **catheter** sepsis in children with cancer, we conducted a study to evaluate the benefit of adding broad-spectrum antibiotics to the **catheter** "flush solution." In a prospective, placebo-controlled, double-blinded, randomized trial, 69 children with different types of malignancies were studied. The central venous **catheters** in these children were flushed with either the standard solution (normal saline + 100 U/ml of heparin) or the study solution (25 microgram/ml of both amikacin and vancomycin added to the standard solution). At the conclusion of the study, 64 children with a total of 67 indwelling central venous lines were assessable. The total **catheter** days on study were 20,700 days, with a median of 323 **catheter** days per patient. We documented 10 events of **catheter**-related infections (0.49 events/1,000 **catheter** days at risk). Five of these events were **catheter**-related sepsis (0.24 sepsis/1,000 **catheter** days): two were fungal and three were bacterial. Due to the low incidence of **catheter**-related sepsis in this study, no statement regarding the prophylactic use of antibiotics could be made. The extremely low rate of **catheter**-related sepsis reported herein may be retrospectively attributed to continuous staff education regarding aseptic techniques in handling these **catheters**. Staff education is essential, and probably the most effective factor in preventing **catheter**-related sepsis.



Complete record☐ Citation 2**Unique Identifier**

97176977

**Authors**Barriga FJ. Varas M. Potin M. Sapunar F. Rojo H. Martinez A. Capdeville V. Becker A. Vial PA.**Institution**

Department of Pediatrics, Pontificia Universidad Catolica de Chile, Santiago, Chile.

**Title**Efficacy of a vancomycin solution to prevent bacteremia associated with an indwelling central venous **catheter** in neutropenic and non-neutropenic cancer patients.**Source**

Medical &amp; Pediatric Oncology. 28(3):196-200, 1997 Mar.

**Abstract**

We evaluated the efficacy of a vancomycin solution in the prevention of bacteremia caused by vancomycin-sensitive organisms (VSO) in cancer patients with a tunneled central venous **catheter** (CVC). Eighty-three patients who had a single lumen CVC were randomized to use a heparin solution (25 U/ml) for daily **catheter flush** with (HepVan) or without (Hep) vancomycin, 25 mcg/ml. Febrile episodes were recorded, and central and peripheral blood cultures were drawn before beginning antibiotic therapy. Patients participated in follow-up to 16,677 **catheter** days (8,666 Hep and 8,011 HepVan), and 143 febrile episodes were recorded (82 Hep and 61 HepVan). Forty-four episodes of bacteremia occurred, 23 of them due to VSO (16 occurred in the Hep group and 7 in the HepVan group ( $P = 0.19$ ). VSO bacteremia occurred in 14 neutropenic (absolute neutrophil count  $< 500 \times 10^9/l$ ) episodes (7 Hep vs. 7 HepVan) and in 9 non-neutropenic episodes (9 Hep vs. 0 HepVan;  $P = 0.013$ ). Vancomycin effectively prevented bacteremia by VSO in non-neutropenic patients, supporting the idea that intraluminal colonization of indwelling CVCs contributes to bacteremia only in these patients.





Complete record

☐ Citation 3

**Unique Identifier**

97017419

**Authors**

Scavini M. Reich S. Eaton RP. Charles MA. Dunn FL.

**Institution**

Istituto Scientifico H San Raffaele, Milano, Italy.

**Title**

Use of an integrated sideport for diagnosis and management of decreased flow rates in a programmable implanted insulin delivery system. Implantable Insulin Pump Trial Study Group.

**Source**

Artificial Organs. 20(9):991-6, 1996 Sep.

**Abstract**

The aim of this study was to develop procedures for the diagnosis and nonsurgical management of decreased insulin flow in an implantable programmable pump for long-term intraperitoneal or intravenous insulin delivery featuring a sideport. Patency of the **catheter** lumen was tested by measuring the time needed for sideport pressure to decrease by 50% after the injection of 0.1 ml of buffer solution. Pumping unit performances were assessed by measuring the volume of pump pulses after diverting the pump flow at the sideport. A **catheter flush** with buffer solution through the sideport was effective in clearing 79% of intraperitoneal and 84% of intravenous **catheter** occlusions. Washing the pumping unit with an alkaline solution after diverting pump flow at the sideport was effective in dissolving insulin aggregates inside the pumping unit and in restoring normal pump flow. These procedures were associated with a 1.3% rate of hypoglycemic episodes.



[Complete record](#)☐ Citation 4**Unique Identifier**

96279767

**Authors**Ravenscraft SA. Shapiro RS. Nahum A. Burke WC. Adams AB. Nakos G. Marini JJ.**Institution**Department of Pulmonary and Critical Care Medicine, University of Minnesota,  
St. Paul-Ramsey Medical Center, St. Paul 55101-2595, USA.**Title**Tracheal gas insufflation: **catheter** effectiveness determined by expiratory **flush** volume.**Source**

American Journal of Respiratory &amp; Critical Care Medicine. 153(6 Pt 1):1817-24, 1996 Jun.

**Abstract**

Used adjunctively during mechanical ventilation, tracheal gas insufflation (TGI) improves CO<sub>2</sub> elimination, principally by decreasing effective anatomic dead space. Continuing lung deflation at end- expiration raises the end-expiratory CO<sub>2</sub> concentration within the proximal airway, and could theoretically reduce the efficiency of a given **catheter** flow. To test this possibility, we designed a series of experiments that examined the influence of TGI delivery patterns on the efficiency of CO<sub>2</sub> elimination. Using a gating device, **catheter** flow was delivered selectively during desired portions of expiration. Paralyzed, ventilated dogs were studied at short and extended inspiratory time fractions (TI/TT) with inspiratory tidal volume and ventilator frequency held constant. The expiratory **flush** volume, not the pattern of gas delivery, determined the observed decline in PaCO<sub>2</sub>, provided that the end-expiratory period was included in the **catheter flush** period. Despite continuing end-expiratory lung deflation (extended TI/TT), **catheter** effectiveness remained the same at matched expiratory **flush** volumes. To determine if enhanced distal mixing at the higher **catheter** flows required during the extended TI/TT (to match expiratory **flush** volume) masked a decrease in efficiency, we repeated the experiment with a tip-inverted **catheter**. We again found that matched **catheter** delivered expiratory volumes were similarly effective. With or without ongoing lung deflation, the volume of gas **flushed** during the expiratory period determined the effectiveness of TGI, provided that inspired minute ventilation remains unchanged and end-expiration is included in the **catheter flush** period.



*antibiotic lock*☐ Citation 1**Unique Identifier**

97138749

**Authors**Bregenzer T. Widmer AF.**Title**Bloodstream infection from a Port-A-Cath: successful treatment with the **antibiotic lock** technique [letter].**Source**

Infection Control &amp; Hospital Epidemiology. 17(12):772, 1996 Dec.

**Abbreviated Source**

Infect Control Hosp Epidemiol. 17(12):772, 1996 Dec.

**NLM Journal Code**

ich

**Journal Subset**

N

**Country of Publication**

United States

**MeSH Subject Headings**Adult\*Antibiotics, Glycopeptide\*Bacteremia / et [Etiology]Case Report\*Catheterization, Peripheral / ae [Adverse Effects]\*Catheters, Indwelling / ae [Adverse Effects]\*Cross Infection / et [Etiology]FemaleHumanInstillation, Drug\*Staphylococcal Infections / et [Etiology]\*Teicoplanin**Registry Numbers**

0 (Antibiotics, Glycopeptide). 61036-62-2 (Teicoplanin).

**ISSN**

0899-823X

**Publication Type**

Letter.

**Language**

English

**Entry Month**

9705.

☒ Citation 2**Unique Identifier**

96439992

**Authors**Kentos A. Struelens MJ. Thys JP.**Title****Antibiotic-lock** technique for the treatment of central venous catheter infections [letter; comment]  
[see comments].**Comments**Comment on: Clin Infect Dis 1995 Nov;21(5):1286-8, Comment in: Clin Infect Dis 1997  
Apr;24(4):743-4**Source**

Clinical Infectious Diseases. 23(2):418-9, 1996 Aug.

**Abbreviated Source**

Clin Infect Dis. 23(2):418-9, 1996 Aug.

**NLM Journal Code**

a4j

**Country of Publication**

United States

**MeSH Subject Headings**\*Antibiotics / tu [Therapeutic Use]\*Catheterization, Central Venous / ae [Adverse Effects]\*Home Infusion Therapy / mt [Methods]Human\*Sepsis / dt [Drug Therapy]**Registry Numbers**

0 (Antibiotics).

**ISSN**

1058-4838

**Publication Type**

Comment. Letter.

**Language**

English

**Entry Month**

9702 Revised: 970825.



☒ Citation 3**Unique Identifier**

96149937

**Authors**Krzywda EA. Andris DA. Edmiston CE Jr. Quebbeman EJ.**Institution**

Department of Surgery, Medical College of Wisconsin, Milwaukee 53226, USA.

**Title**Treatment of Hickman catheter sepsis using **antibiotic lock** technique.**Source**

Infection Control &amp; Hospital Epidemiology. 16(10):596-8, 1995 Oct.

**Abbreviated Source**

Infect Control Hosp Epidemiol. 16(10):596-8, 1995 Oct.

**NLM Journal Code**

ich

**Journal Subset**

N

**Country of Publication**

United States

**MeSH Subject Headings**\*Antibiotics / ad [Administration & Dosage]Antibiotics / tu [Therapeutic Use]\*Bacterial Infections / pc [Prevention & Control]\*Catheterization, Central Venous / ae [Adverse Effects]Catheters, Indwelling / ae [Adverse Effects]Catheters, Indwelling / mi [Microbiology]Equipment ContaminationHuman**Abstract**

**Antibiotic lock** therapy, an alternative treatment for Hickman catheter sepsis, was evaluated in six recipients of prolonged outpatient intravenous therapy. Twenty-two episodes of catheter sepsis were identified, involving coagulase-negative staphylococci (11), gram-negative bacilli (3), gram-positive bacilli (1), yeast (4), and mixed bacteria or fungi (3). In a select group of patients, treatment was successful 92% of the time.

**Registry Numbers**

0 (Antibiotics).

**ISSN**

0899-823X

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9605.



☒ Citation 4**Unique Identifier**

95407134

**Authors**Hajek R. Mayer J. Tomiska M.**Institution**

II. interni klinika FN, Brno Bohunice.

**Title**

[Present possibilities of prevention of infectious complications associated with central venous catheter systems]. [Review] [40 refs] [Czech]

**Original Title**

Soucasne moznosti profylaxe infekcnich komplikaci centralnich zilnich systemu.

**Source**

Vnitřní Lekarství. 41(6):427-31, 1995 Jun.

**Abbreviated Source**

Vnitr Lek. 41(6):427-31, 1995 Jun.

**NLM Journal Code**

xfy

**Country of Publication**

Czech Republic

**MeSH Subject Headings**\*Catheterization, Central Venous / ae [Adverse Effects]\*Cross Infection / et [Etiology]Cross Infection / pc [Prevention & Control]English AbstractHuman**Abstract**

Central venous access devices are a major source of nosocomial infection. The skin and catheter hub are the two major sources for the introduction of the colonizing organisms. Authors reviewed up-to-date prophylactic possibilities in this paper. Prophylactic measures include a skilled team, topical disinfectants, topical **antibiotics**, new types of devices such as coating catheter with antiseptic agent and catheter with silver impregnated cuffs, maximal barrier precautions during insertion, systemic vancomycin therapy of high risk patients. Exchanging central venous catheters over a guidewire might be useful diagnostically but have not been used to be of any therapeutic or prophylactic goal. Prophylactic **antibiotic lock** of device and use of fibrinolytic agent to clean the device may be useful but can not be a standard recommendation. [References: 40]

**ISSN**

0042-773X

**Publication Type**

Journal Article. Review. Review, Academic.

**Language**

Czech

**Entry Month**

9512.

# **EXHIBIT 4**

☐ Citation 6**Unique Identifier**

98252557

**Authors**Balbuena L. Stambaugh KI. Ramirez SG. Yeager C.**Institution**Department of Surgery, Brooke Army Medical Center, Fort Sam Houston, Texas  
78234-6355, USA.**Title**

Effects of topical oral antiseptic rinses on bacterial counts of saliva in healthy human subjects.

**Source**

Otolaryngology - Head &amp; Neck Surgery. 118(5):625-9; 1998 May.

**Abbreviated Source**

Otolaryngol Head Neck Surg. 118(5):625-9, 1998 May.

**NLM Journal Code**

on8

**Country of Publication**

United States

**MeSH Subject Headings**Administration, OralAdministration, TopicalAdolescenceAdultAnalysis of VarianceAnti-Infective Agents / ad [Administration & Dosage]Anti-Infective Agents / tu [Therapeutic Use]Anti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]Antibiotic ProphylaxisAntibiotics / ad [Administration & Dosage]Antibiotics / tu [Therapeutic Use]\*Bacteria / de [Drug Effects]Bacteria / gd [Growth & Development]Bacteria, Aerobic / de [Drug Effects]Bacteria, Aerobic / gd [Growth & Development]Bacteria, Anaerobic / de [Drug Effects]Bacteria, Anaerobic / gd [Growth & Development]Chlorhexidine / aa [Analogues & Derivatives]Chlorhexidine / ad [Administration & Dosage]Chlorhexidine / tu [Therapeutic Use]Colony Count, MicrobialComparative StudyDrug CombinationsFollow-Up Studies

Human  
Incidence  
Injections, Intravenous  
Middle Age  
\*Mouthwashes / tu [Therapeutic Use]  
Prospective Studies  
Salicylates / ad [Administration & Dosage]  
Salicylates / tu [Therapeutic Use]  
\*Saliva / mi [Microbiology]  
Sodium Chloride  
Surgical Wound Infection / pc [Prevention & Control]  
Terpenes / ad [Administration & Dosage]  
Terpenes / tu [Therapeutic Use]

**Abstract**

Wound infections remain a significant source of morbidity in patients undergoing major head and neck operations that invade the aerodigestive tract. Infection rates have been significantly reduced by the administration of perioperative intravenous antibiotics; however, the incidence of infection remains unacceptably high. This study was undertaken to help identify an oral antiseptic that could significantly reduce the bacterial colony count of human saliva. A randomized, prospective clinical trial was conducted to analyze and compare the effects of Listerine antiseptic and Peridex oral rinse on the aerobic and anaerobic bacterial counts in healthy human subjects. Thirty healthy adult volunteers between the ages of 18 and 61 participated in the study. The patients were randomized to receive normal saline solution, Listerine antiseptic, or Peridex oral rinse. Aerobic and anaerobic bacterial colony counts of saliva were measured before treatment and at 1 and 4 hours after treatment. Both Listerine antiseptic and Peridex oral rinse significantly reduced bacterial counts at 1 hour after treatment in our volunteers. At 4 hours after treatment, Peridex oral rinse showed a further reduction in the bacterial colony count whereas Listerine antiseptic showed no difference compared with normal saline solution. At 4 hours after treatment, Peridex oral rinse reduced the total bacterial colony count by 85%.

**Registry Numbers**

0 (Anti-Infective Agents). 0 (Anti-Infective Agents, Local). 0 (Antibiotics). 0 (Drug Combinations). 0 (Mouthwashes). 0 (Salicylates). 0 (Terpenes). 18472-51-0 (chlorhexidine gluconate). 51273-66-6 (Listerine). 55-56-1 (Chlorhexidine). 7647-14-5 (Sodium Chloride).

**ISSN**

0194-5998

**Publication Type**

Clinical Trial. Journal Article. Randomized Controlled Trial.

**Language**

English

**Entry Month**

9808. Entry Week: 98081.



**□ Citation 11****Unique Identifier**

98189555

**Authors**Marone P. Monzillo V. Perversi L. Carretto E.**Institution**Bacteriology and Mycology Laboratory, Infectivology Section, IRCCS  
Policlinico S.Matteo, Pavia, Italy.**Title**Comparative in vitro activity of silver sulfadiazine, alone and in combination with cerium nitrate,  
against staphylococci and gram-negative bacteria.**Source**

Journal of Chemotherapy. 10(1):17-21, 1998 Feb.

**Abbreviated Source**

J Chemother. 10(1):17-21, 1998 Feb.

**NLM Journal Code**

jcy

**Country of Publication**

Italy

**MeSH Subject Headings**\*Anti-Infective Agents,Local / pd [Pharmacology]Burns / mi [Microbiology]\*Cerium / pd [Pharmacology]Drug Combinations\*Gram-Negative Bacteria / de [Drug Effects]HumanMicrobial Sensitivity TestsPseudomonas aeruginosa / de [Drug Effects]\*Silver Sulfadiazine / pd [Pharmacology]Staphylococcal Infections / pc [Prevention & Control]\*Staphylococcus / de [Drug Effects]Surgical Wound Infection / pc [Prevention & Control]**Abstract**

Silver sulfadiazine (SSD), a topical antimicrobial agent, has been widely used for the prophylaxis and treatment of burn infections during the past 30 years. We determined the antimicrobial activity of SSD, alone and in combination with cerium nitrate (CN), gentamicin and amikacin against 130 recent clinical isolates, including multiresistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) or *Pseudomonas aeruginosa*. The overall activity of SSD was good against all the tested strains and it was particularly high against MRSA (MIC<sub>90</sub> 100 microg/ml). CN showed no inhibitory effect, even up to 800 microg/ml, on bacterial strains tested. The combination of SSD and CN was as active as SSD alone. In conclusion, SSD has a broad spectrum of activity at concentrations lower than those commonly used in clinical preparations. All strains were inhibited by less than one-fiftieth of the SSD "in use" concentration (10 mg/ml). Our data confirm the efficacy of this topical agent in the prevention and treatment of infections in burns or other surgical wounds and suggest its possible use in clearing staphylococcal carriage as an alternative to mupirocin.

**Registry Numbers**

0 (Anti-Infective Agents, Local). 0 (Drug Combinations). 17309-53-4 (cerium nitrate).  
22199-08-2 (Silver Sulfadiazine). 7440-45-1 (Cerium).

**ISSN**

1120-009X

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9807. Entry Week: 98074.



☐ Citation 12**Unique Identifier**

98186588

**Authors**Skold K. Twetman S. Hallgren A. Yucel-Lindberg T. Modeer T.**Institution**

Department of Orthodontics, Medical and Dental Center, Halmstad, Sweden.

**Title**

Effect of a chlorhexidine/thymol-containing varnish on prostaglandin E2 levels in gingival crevicular fluid.

**Source**

European Journal of Oral Sciences. 106(1):571-5, 1998 Feb.

**Abbreviated Source**

Eur J Oral Sci. 106(1):571-5, 1998 Feb.

**NLM Journal Code**

cbq

**Journal Subset**

D

**Country of Publication**

Denmark

**MeSH Subject Headings**AdolescenceAdultAnti-Infective Agents,Local / ad [Administration & Dosage]\*Anti-Infective Agents,Local / tu [Therapeutic Use]ChildChlorhexidine / ad [Administration & Dosage]Chlorhexidine / pd [Pharmacology]\*Chlorhexidine / tu [Therapeutic Use]Comparative Study\*Dinoprostone / an [Analysis]FemaleFollow-Up StudiesGingival Crevicular Fluid / ch [Chemistry]\*Gingival Crevicular Fluid / de [Drug Effects]Gingival Hemorrhage / et [Etiology]Gingival Hemorrhage / pc [Prevention & Control]Gingivitis / et [Etiology]Gingivitis / pc [Prevention & Control]HumanMaleOrthodontic Appliances / ae [Adverse Effects]Orthodontic Brackets / ae [Adverse Effects]Paint

Placebos

Radioimmunoassay

Support, Non-U.S. Gov't

Thymol / ad [Administration & Dosage]

\*Thymol / tu [Therapeutic Use]

### Abstract

The aim was to study the effect of a chlorhexidine/thymol-containing varnish (Cervitec) on the levels of prostaglandin E2 (PGE2) in gingival crevicular fluid (GCF). The material consisted of 25 adolescents and young adults with fixed orthodontic appliances exhibiting gingival inflammation. Four buccal sites, adjacent to bands and brackets, were selected on each patient and randomly treated with either a varnish containing chlorhexidine diacetate (1% w/w) and thymol (1% w/w) or a placebo varnish without active ingredients. After baseline registration, the varnishes were applied twice within 3 d. Follow-up examinations were performed after 3, 8 and 30 d. The gingival inflammation was assessed by bleeding on probing, volume of GCF with a Periotron 8000 and PGE2 level in GCF by using a radioimmuno assay. Compared with baseline, a statistically significant reduction in the volume of GCF was recorded at the chlorhexidine/thymol treated sites in contrast to the placebo. The mean PGE2 levels were significantly reduced after the test varnish treatment compared with baseline and differed significantly from placebo after 8 d. The findings suggest that treatments with the antibacterial varnish result in reduced gingival inflammation and may thus be beneficial for patients with fixed orthodontic appliances.

### Registry Numbers

0 (Anti-Infective Agents, Local). 0 (Placebos). 363-24-6 (Dinoprostone). 55-56-1 (Chlorhexidine). 89-83-8 (Thymol).

### ISSN

0909-8836

### Publication Type

Clinical Trial. Journal Article. Randomized Controlled Trial.

### Language

English

### Entry Month

9807. Entry Week: 98074.





☐ Citation 15**Unique Identifier**

98185660

**Authors**Vokus RP. Cisneros GJ. Levi M.**Institution**

Albert Einstein College of Medicine, USA.

**Title**

Antibacterial properties of current orthodontic band cements.

**Source**

Pediatric Dentistry. 20(1):43-8, 1998 Jan-Feb.

**Abbreviated Source**

Pediatr Dent. 20(1):43-8, 1998 Jan-Feb.

**NLM Journal Code**

pan

**Journal Subset**

D

**Country of Publication**

United States

**MeSH Subject Headings**Analysis of VarianceAnti-Infective Agents,Local / ch [Chemistry]\*Anti-Infective Agents,Local / pd [Pharmacology]Chemistry, PhysicalDental BondingDental Cements / ch [Chemistry]\*Dental Cements / pd [Pharmacology]DiffusionFluorides / ch [Chemistry]Glass Ionomer Cements / ch [Chemistry]Glass Ionomer Cements / pd [Pharmacology]HumanHydrogen-Ion ConcentrationMaterials Testing\*Orthodontic BracketsPolycarboxylate Cement / ch [Chemistry]Polycarboxylate Cement / pd [Pharmacology]Resin Cements / ch [Chemistry]Resin Cements / pd [Pharmacology]Stainless Steel\*Streptococcus mutans / de [Drug Effects]Time FactorsZinc Phosphate Cement / ch [Chemistry]Zinc Phosphate Cement / pd [Pharmacology]

**Abstract**

**PURPOSE:** Manufacturers commonly provide information on the physical properties of dental materials, but information on their antibacterial properties is often missing. This study determined the antibacterial properties of four currently used orthodontic band cements against three different strains of *Streptococcus mutans*.

**METHODS:** The cements utilized were Durelon, Ketac, Mizzy Zinc Phosphate, and Band-Lok, a recently introduced, resin-based, dual-cure glass ionomer cement. Disk diffusion assay methodology was used to test for zones of bacterial inhibition around cement samples. Zones of inhibition were measured in millimeters using an electronic caliper. In addition to cured cement plugs and freshly mixed cement samples, a new variation, in the form of a cement plug surrounding a stainless-steel band, was tested. Twelve combinations resulted from the four cement types and three forms.

**RESULTS:** Of the variables studied, the mix forms of Durelon, Ketac, and Mizzy Zinc Phosphate cement showed the greatest bacterial inhibition (Kruskal-Wallis,  $P < 0.05$ ). Among the cements tested, Mizzy Zinc Phosphate showed the largest zones of inhibition, with Durelon and Ketac having comparable zones of inhibition (Kruskal-Wallis,  $P < 0.05$ ). Band-Lok did not exhibit an inhibitory effect against any of the three strains of *S. mutans* tested.

**CONCLUSION:** A "containment effect" of no bacterial inhibition was observed in the cement samples surrounded by the stainless-steel band material.

**Registry Numbers**

0 (ketac-molar). 0 (**Anti-Infective Agents, Local**). 0 (Band-Lok). 0 (Dental Cements). 0 (Fluorides). 0 (Glass Ionomer Cements). 0 (Polycarboxylate Cement). 0 (Resin Cements). 12597-68-1 (Stainless Steel). 25916-47-6 (zinc polyacrylate). 7779-90-0 (Zinc Phosphate Cement).

**ISSN**

0164-1263

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9807. Entry Week: 98073.



☐ Citation 17**Unique Identifier**

98182633

**Authors**Yesilkaya A. Yegin A.**Institution**Department of Biochemistry, School of Medicine, Akdeniz University, Antalya,  
Turkey.**Title**Inhibition of human erythrocyte (Na(+)-K+)ATPase by organic hydroperoxides and protection by  
ascorbic acid and butylated hydroxytoluene.**Source**

General Pharmacology. 30(4):495-8, 1998 Apr.

**Abbreviated Source**

Gen Pharmacol. 30(4):495-8, 1998 Apr.

**NLM Journal Code**

flk

**Country of Publication**

England

**MeSH Subject Headings**\*Anti-Infective Agents,Local / pd [Pharmacology]\*Antioxidants / pd [Pharmacology]\*Ascorbic Acid / pd [Pharmacology]\*Butylated Hydroxytoluene / pd [Pharmacology]\*Erythrocytes / en [Enzymology]Human\*Hydrogen Peroxide / pd [Pharmacology]\*Na(+)-K(+)-Exchanging ATPase / ai [Antagonists & Inhibitors]**Abstract**

1. The in vitro effects of cumene hydroperoxide and t-butyl hydroperoxide on intact human erythrocyte membrane (Na(+)-K+)ATPase activities have been studied. 2. (Na(+)-K+)ATPase activities on erythrocyte membranes decreased in agreement with the results of chemiluminescence experiments. 3. Our results demonstrated that the organic hydroperoxides inhibit the activity of (Na(+)-K+) ATPase enzyme and that the antioxidants used prevent this inhibition.

**Registry Numbers**

EC 3-6-1-37 (Na(+)-K(+)-Exchanging ATPase). 0 (Anti-Infective Agents, Local). 0 (Antioxidants). 128-37-0 (Butylated Hydroxytoluene). 50-81-7 (Ascorbic Acid). 7722-84-1 (Hydrogen Peroxide).

**ISSN**

0306-3623

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9807. Entry Week: 98073.



☐ Citation 31**Unique Identifier**

98137829

**Authors**Iliev D. Elsner P.**Institution**

Department of Dermatology, University Hospital Zurich, Switzerland.

**Title**

Unusual edge effect in patch testing with silver nitrate.

**Source**

American Journal of Contact Dermatitis. 9(1):57-9, 1998 Mar.

**Abbreviated Source**

Am J Contact Dermat. 9(1):57-9, 1998 Mar.

**NLM Journal Code**

clx

**Country of Publication**

United States

**MeSH Subject Headings**\*Allergens\*Anti-Infective Agents,Local / ae [Adverse Effects]Case ReportDermatitis, Allergic Contact / di [Diagnosis]Dermatitis, Allergic Contact / pa [Pathology]Diagnosis, DifferentialHumanMaleMiddle Age\*Patch Tests / ae [Adverse Effects]\*Silver Nitrate / ae [Adverse Effects]Skin / pa [Pathology]**Abstract**

Silver nitrate is a widely used substance and has been applied topically for cauterizing bleeding and healing wounds. In the past it has even been used to mark patch test sites, when no one knew that the substance itself might be a sensitizer. However, there are also toxic reactions to that substance. We report a case in which a positive "edge effect" at the periphery of the patch test site could be shown. It can be explained by the unequal distribution of patch test solutions in the different patch test systems with a concentration at the rim. Distinguishing between allergic and toxic reactions may be difficult when an edge effect occurs. Therefore, in certain rare cases a biopsy or a lymphocyte transformation test might be of help.

**Registry Numbers**

0 (Allergens). 0 (Anti-Infective Agents, Local). 7761-88-8 (Silver Nitrate).

**ISSN**

1046-199X

**Publication Type**

Journal Article.

**Language**

English

**Entry Month**

9806. Entry Week: 98061.



# **EXHIBIT 5**



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PO#:

M A T E R I A L   S A F E T Y   D A T A   S H E E T      P A G E    1

SECTION 1. - - - - - CHEMICAL IDENTIFICATION- - - - -

CATALOG #: B3412  
NAME: BERBERINE HEMISULFATE

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - -

CAS #: 633-66-9  
MF: C20H18NO4  
EC NO: 211-196-4

SYNONYMS

ACID BERBERINE SULFATE \* BERBERINE BISULFATE \* BERBERINE HYDROGEN  
SULFATE \* BERBERINE SULFATE (1:1) \* BERBERINE SULPHATE \* SIARCZANU  
BERBERYNY (POLISH) \*

SECTION 3. - - - - - HAZARDS IDENTIFICATION - - - - -

LABEL PRECAUTIONARY STATEMENTS

HARMFUL  
HARMFUL BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.  
TARGET ORGAN(S):  
CENTRAL NERVOUS SYSTEM  
HEART  
WEAR SUITABLE PROTECTIVE CLOTHING.

SECTION 4. - - - - - FIRST-AID MEASURES- - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF  
WATER FOR AT LEAST 15 MINUTES.  
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS  
AMOUNTS OF WATER.  
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL  
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.  
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.  
CALL A PHYSICIAN.

SECTION 5. - - - - - FIRE FIGHTING MEASURES - - - - -

EXTINGUISHING MEDIA

CONTINUED ON NEXT PAGE



CUST#: 1-085-83857

## M A T E R I A L   S A F E T Y   D A T A   S H E E T

PAGE 2

-----  
CATALOG #: B3412  
NAME: BERBERINE HEMISULFATE  
WATER SPRAY.  
CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.

SPECIAL FIREFIGHTING PROCEDURES  
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO  
PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS  
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

## SECTION 6. - - - - - ACCIDENTAL RELEASE MEASURES- - - - -

WEAR RESPIRATOR, CHEMICAL SAFETY GOGGLES, RUBBER BOOTS AND HEAVY  
RUBBER GLOVES.  
SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.  
AVOID RAISING DUST.  
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

## SECTION 7. - - - - - HANDLING AND STORAGE- - - - -

REFER TO SECTION 8.

## SECTION 8. - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - -

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT  
GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.  
SAFETY SHOWER AND EYE BATH.  
MECHANICAL EXHAUST REQUIRED.  
WASH THOROUGHLY AFTER HANDLING.

## SECTION 9. - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - -

APPEARANCE AND ODOR  
SOLID.

PHYSICAL PROPERTIES  
MELTING POINT: ~208°C  
SOLUBILITY:  
WATER -SOLUBLE

## SECTION 10. - - - - - STABILITY AND REACTIVITY - - - - -

STABILITY

CONTINUED ON NEXT PAGE

CUST#: 1-085-83857

## M A T E R I A L   S A F E T Y   D A T A   S H E E T

PAGE 3

CATALOG #: B3412  
NAME: BERBERINE HEMISULFATE  
STABLE.

INCOMPATIBILITIES  
STRONG OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS  
TOXIC FUMES OF:  
CARBON MONOXIDE, CARBON DIOXIDE  
NITROGEN OXIDES  
SULFUR OXIDES

HAZARDOUS POLYMERIZATION  
WILL NOT OCCUR.

## SECTION 11. - - - - - TOXICOLOGICAL INFORMATION - - - - -

## ACUTE EFFECTS

HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.  
MAY CAUSE EYE IRRITATION.  
MAY CAUSE SKIN IRRITATION.  
MATERIAL MAY BE IRRITATING TO MUCOUS MEMBRANES AND UPPER  
RESPIRATORY TRACT.  
EXPOSURE TO LARGE CONCENTRATIONS CAN DEPRESS THE HEART AND RESPIRATION  
AND CAN CAUSE CIRCULATORY COLLAPSE.

## CHRONIC EFFECTS

TARGET ORGAN(S):  
CENTRAL NERVOUS SYSTEM  
HEART  
SMOOTH MUSCLE  
KIDNEYS  
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND  
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

RTECS #: DR9867000

BERBINIUM,  
7,8,13,13A-TETRADEHYDRO-9,10-DIMETHOXY-2,3-(METHYLENEDIOXY)-, SULFATE (

## TOXICITY DATA

IPR-RAT LD50:88500 UG/KG	APPHAX 32,113,1975
ORL-MUS LD50:1 GM/KG	DIPHAH 17,429,1965
IPR-MUS LD50:24300 UG/KG	IJPPAZ 15,111,1971
IMS-MUS LD50:14530 UG/KG	APPHAX 32,113,1975

CONTINUED ON NEXT PAGE

CUST#: 1-085-83857

## M A T E R I A L   S A F E T Y   D A T A   S H E E T

PAGE 4

-----  
CATALOG #: B3412  
NAME: BERBERINE HEMISULFATE  
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES  
(RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR  
COMPLETE INFORMATION.

## SECTION 12. ----- ECOLOGICAL INFORMATION -----

DATA NOT YET AVAILABLE.

## SECTION 13. ----- DISPOSAL CONSIDERATIONS -----

DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A  
CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER.  
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

## SECTION 14. ----- TRANSPORT INFORMATION -----

CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

## SECTION 15. ----- REGULATORY INFORMATION -----

## EUROPEAN INFORMATION

HARMFUL

R 20/21/22

HARMFUL BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.

S 36

WEAR SUITABLE PROTECTIVE CLOTHING.

## REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK

NOHS 1974: HZD 80383; NIS 1; TNF 68; NOS 6; TNE 2770

## SECTION 16. ----- OTHER INFORMATION -----

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M A T E R I A L   S A F E T Y   D A T A   S H E E T

PAGE 1

SECTION 1. - - - - - CHEMICAL IDENTIFICATION - - - - -

CATALOG #: B3251  
NAME: BERBERINE CHLORIDE

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - -

CAS #: 633-65-8  
MF: C20H18CLN04  
EC NO: 211-195-9

SYNONYMS

BERBERINE CHLORIDE \* BENZO(6)(1,3)BENZODIOXOLO(5,6-A)QUINOLIZINIUM, 5,  
6-DIHYDRO-9,10-DIMETHOXY-, CHLORIDE (9CI) \* BERBERINE HYDROCHLORIDE \*  
BERBERINIUM CHLORIDE \*

SECTION 3. - - - - - HAZARDS IDENTIFICATION - - - - -

LABEL PRECAUTIONARY STATEMENTS

HARMFUL  
HARMFUL BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.  
WEAR SUITABLE PROTECTIVE CLOTHING.

SECTION 4. - - - - - FIRST-AID MEASURES - - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS  
AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED  
CLOTHING AND SHOES.  
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL  
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.  
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.  
CALL A PHYSICIAN.  
WASH CONTAMINATED CLOTHING BEFORE REUSE.

SECTION 5. - - - - - FIRE FIGHTING MEASURES - - - - -

EXTINGUISHING MEDIA

CARBON DIOXIDE.  
DRY CHEMICAL POWDER.  
WATER SPRAY.

CONTINUED ON NEXT PAGE

CUST#: 1-085-83857

## MATERIAL SAFETY DATA SHEET PAGE 2

CATALOG #: B3251  
NAME: BERBERINE CHLORIDE

## SPECIAL FIREFIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO  
PREVENT CONTACT WITH SKIN AND EYES.

## UNUSUAL FIRE AND EXPLOSIONS HAZARDS

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

## SECTION 6. - - - - - ACCIDENTAL RELEASE MEASURES- - - - -

WEAR RESPIRATOR, CHEMICAL SAFETY GOGGLES, RUBBER BOOTS AND HEAVY  
RUBBER GLOVES.  
SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.  
AVOID RAISING DUST.  
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

## SECTION 7. - - - - - HANDLING AND STORAGE- - - - -

REFER TO SECTION 8.

## SECTION 8. - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - -

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT  
GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.  
SAFETY SHOWER AND EYE BATH.  
MECHANICAL EXHAUST REQUIRED.  
DO NOT BREATHE DUST.  
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.  
AVOID PROLONGED OR REPEATED EXPOSURE.  
WASH THOROUGHLY AFTER HANDLING.  
HARMFUL SOLID.  
KEEP CONTAINER CLOSED.  
STORE IN A COOL DRY PLACE.

## SECTION 9. - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - -

APPEARANCE AND ODOR  
GOLD POWDER

## PHYSICAL PROPERTIES

MELTING POINT: 200 C (DEC)

## SECTION 10. - - - - - STABILITY AND REACTIVITY - - - - -

CONTINUED ON NEXT PAGE

CUST#: 1-085-83857

## M A T E R I A L   S A F E T Y   D A T A   S H E E T

PAGE 3

CATALOG #: B3251  
NAME: BERBERINE CHLORIDE  
INCOMPATIBILITIES  
STRONG OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS  
THERMAL DECOMPOSITION MAY PRODUCE CARBON MONOXIDE, CARBON DIOXIDE,  
AND NITROGEN OXIDES.  
HYDROGEN CHLORIDE GAS

## SECTION 11. - - - - - TOXICOLOGICAL INFORMATION - - - - -

## ACUTE EFFECTS

MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.  
MAY CAUSE SKIN IRRITATION.  
MAY CAUSE EYE IRRITATION.  
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND  
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

RTECS #: DR9866400

BERBINIUM,

7,8,13,13A-TETRADEHYDRO-9,10-DIMETHOXY-2,3-(METHYLENEDIOXY)-, CHLORIDE

## TOXICITY DATA

ORL-RAT LD50: &gt;15 GM/KG

IVN-RAT LD50: 60 MG/KG

ORL-MUS LD50: &gt;29586 MG/KG

IPR-MUS LD50: 37 MG/KG

UNR-MUS LD50: 30 MG/KG

KSRNAM 8,654,1974

ZYAEU 25,335,1990

KSRNAM 8,654,1974

JPETAB 104,253,1952

PCJOAU 22,856,1988

## TARGET ORGAN DATA

BEHAVIORAL (CONVULSIONS OR EFFECT ON SEIZURE THRESHOLD)

BEHAVIORAL (EXCITEMENT)

LUNGS, THORAX OR RESPIRATION (DYSPNAE)

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES  
(RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR  
COMPLETE INFORMATION.

## SECTION 12. - - - - - ECOLOGICAL INFORMATION - - - - -

DATA NOT YET AVAILABLE.

## SECTION 13. - - - - - DISPOSAL CONSIDERATIONS - - - - -

DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A

CONTINUED ON NEXT PAGE

CUST#: 1-085-83857

M A T E R I A L   S A F E T Y   D A T A   S H E E T

PAGE 4

-----  
CATALOG #: B3251  
NAME: BERBERINE CHLORIDE  
CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER.  
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. ----- TRANSPORT INFORMATION -----

CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. ----- REGULATORY INFORMATION -----

EUROPEAN INFORMATION

HARMFUL

R 20/21/22

HARMFUL BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.

S 36

WEAR SUITABLE PROTECTIVE CLOTHING.

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK

EPA TSCA SECTION 8(B) CHEMICAL INVENTORY

SECTION 16. ----- OTHER INFORMATION -----

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## GOLDENSEAL

**COMMON NAME** : Goldenseal, yellow root, eye root, Indian turmeric, jaundice root

**LATIN NAME** : *Hydrastis canadensis*

**ORIGIN** : Northern America

**PART OF PLANT USED** : Rhizome (root-stock)

**ACTIVE SUBSTANCES** : alkaloids (Hydrastine, Berberine, Canadine, Berber-astine)

**STANDARD** : 10% alkaloids (5% Hydrastine)

**DESCRIPTION** : Goldenseal root has been used by Native American healers for a wide range of ailments. The Indians used goldenseal for local inflammations and infections. The plant was also utilized to improve digestion as a bitter tonic and to treat ulcers. An infusion of the root was used as a soothing rinse for eye and skin infections.

**PHYSIOLOGY** : The active ingredients of goldenseal include a group of alkaloids, hydrastine and berberine. These alkaloids are strongly astringent and help reduce inflammation of mucous membranes. These alkaloids also have antiseptic properties. Hydrastine has been reported to lower blood pressure and stimulate peristalsis. Hydrastine is also anti-tussive. Berberine induces the secretion of bile and helps stop bleeding. A great deal of research has shown that berberine has anti-bacterial, anti-fungal and anti-parasitic activity. Goldenseal stimulates involuntary muscles through an oxytocic effect in the intestinal tract and uterus. The plant has been used during childbirth when the labor is protracted.

**ACTIVE PROPERTIES** : Goldenseal root has been recommended for a variety of inflamed mucous membranes, including stomach, intestinal, vaginal, and rectal. It has been reported that the plant relieves pains and helps heal wounds and stop bleeding. In addition the antibacterial action helps reduce or prevent infection of open sores. The Cherokee and Iroquois used the plant for diarrhea, dyspepsia, liver problems, flatulence, pneumonia, cancer, and rattlesnake bites. Modern uses have included as a laxative, for hemorrhoids, mouth sores, diuretic, eye infections, acne, sorethroats, to ward off infections, and as an antiseptic.

**DIRECTIONS FOR USE** : 250 mg. extract. Do not use for extended periods of time (greater than a week at a time).

**TOXICITY, CAUTIONS & CONTRA-INDICATIONS** : At doses of 2-3 gr. goldenseal can lower heart beat and at higher doses it can be paralyzing to the Central Nervous System (CNS). Do not use during pregnancy since Berberine stimulates the uterus. May induce abortion at high doses.

**[Return to Home Page](#)**



## GOLDENSEAL ROOT

The golden, yellow root of this plant gives it its name. It has antibiotic properties stronger than many prescription medicines and is able to target "unwanted" bacteria, as well as protozoa and yeasts. It is unique in that it does not harm the "beneficial" bacteria that are necessary in the digestive tract. The alkaloid berberine has the added benefit of increasing blood flow through the spleen, where it also increases the immune-building activity of the large supply of white blood cells there. By many herbalists it is considered one of the most powerful herbs. It is a substitute for quinine. It is one of the most effective remedies for inflamed and catarrhal conditions of the mucus membranes. It has the ability to heal mucus membranes anywhere in the body (bronchial tubes, throat, intestines, stomach, etc.). Indications include: for open sores, eczema, ringworm, and skin diseases; diphtheria, tonsillitis and severe throat problems; sluggish digestion; used with Skullcap and Hops for the spinal nerves; spinal meningitis; pyorrhea and sore gums; sinus difficulties; bladder disorders and lower bowel problems (can use as an enema); infection; flu; diabetes; constipation; colds; cankers; psoriasis; heart disorders; and gallbladder/spleen/pancreas. CAUTION: if a person has high blood pressure, watch for the highs and lows and if they occur, then substitute Myrrh for Goldenseal. Berberine stimulates the uterus - DO NOT use during pregnancy.



## Chloramine-T

**MATERIAL SAFETY DATA SHEET H&S CHEMICAL CO., INC. 1025 Mary Laidley Drive  
Covington, KY 41017 Phone: 606-356-8000 Emergency Phone: 1-800-255-3924**

### SECTION I - PRODUCT IDENTIFICATION

**Product Name:** Chloramine-T, n-chloro-para-toluene sulfonamide sodium salt

**Molecular Weight:** 281.69 g/mole

**Formula:** C<sub>7</sub>H<sub>7</sub>SO<sub>2</sub>N NaCl(3H<sub>2</sub>O)

**CAS #: 127-65-1 PRODUCT CONTAINS NO HAZARDOUS INGREDIENTS PER CFR  
1910.1200**

### SECTION II - PHYSICAL DATA

**Boiling Point:** NA **SP. Gravity:** NA **Melting Point:** 167-169C (dec.) **%Volatiles:** Nil **Appearance:** White powder **PH:** 7 to 9 (Typical 8.5)

**Available Active Chlorine:** 24.8-25.5% (Typical 25.0%) (1 gram in 400 grams water)

**Solubility(H<sub>2</sub>O):** 15% @ 25C, Insoluble in benzene, chloroform, and most ethers, soluble 7.5% in 95% alcohol @ 20C (with decomposition).

### SECTION III - FIRE AND EXPLOSION HAZARD

**Extinguishing Media:** Water, Dry Chemical, CO<sub>2</sub>, Foam

**Special Fire Fighting Procedures:** Wear full protective equipment including self-contained breathing apparatus (eye, body, respiratory).

**Unusual Fire Hazards:** Product may decompose rapidly if heated above 130C.

### SECTION IV - REACTIVITY DATA

**Instability:** Stable at ambient conditions. Material is an oxidizer, contact with other material may cause fire.

**Hazardous Polymerization:** Not expected at ambient conditions.

**Hazardous Decomposition:** This material is an oxidizer and should not be stored with materials that are easily reduced. May decompose rapidly if temperatures reach 60C or above.

**Compatibility:** Incompatible with many organic substances, some acids and ammonium compounds,

stability in formulated products must be tested on individual basis. Packaging materials must be tested on an individual basis.

## SECTION V - SPILL, LEAK AND DISPOSAL PROCEDURES

**Spill:** Sweep up and place in a closed container for disposal. Avoid dust by wearing a dust mask. Protect hands with gloves. Avoid getting clothing. Wash clothing after handling product.

**Disposal:** Collect and dispose of all the waste in accordance with applicable local, state and federal laws. Neutralizing with chemicals such as the reducing agent sodium metabisulfite. Material Safety Data Sheet H&S Chemical Co. Inc.

## SECTION VI - SPECIAL PROTECTIVE EQUIPMENT

Utilize protective rubber gloves and apron. Use in adequately ventilated area. Utilize sufficient general or local exhaust to control dust below levels of 10 milligrams per cubic meter. Use a NIOSH approved respirator for dust. These protective measures should be considered the minimum protection when handling this product. Additional protection may be advisable depending upon conditions of use.

## SECTION VII - HEALTH HAZARD DATA

**Acute Effects:** May be harmful if swallowed, inhaled or absorbed through the skin or eyes. Dust is irritating to the eyes, mucous membranes and upper respiratory tract. This material may cause skin irritation.

**First Aid:** In case of contact, immediately flush eyes or skin with water for at least 15 minutes while removing all contaminated clothing boots or shoes. If inhaled, remove to fresh air, if not breathing give artificial respiration. If breathing is difficult, give oxygen. If ingested and conscious, give several glasses of water. Call a physician. Wash contaminated clothing before reuse.

**Effects of Overexposure:** Long term effects are not known. Prolonged and repeated contact with this chemical may be harmful. Body contact with this chemical may be harmful and should be avoided.

## SECTION VIII - SPECIAL PRECAUTIONS

Always use personal protective equipment and follow safe laboratory practices during handling and storage of this chemical.

Handle only in well ventilated areas.

Do not get in eyes or on skin or on clothing.

Do not take internally.

Do not breathe dust.

Do not expose container to heat.

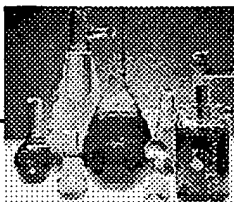
Do not reuse containers.

Clean up spills as they occur.

Do not mix with any foreign materials since they can hasten decomposition.

The data provided is correct to the best of our knowledge. We shall not be held liable for any damages resulting from handling, storage, disposal or contact with this product.

[Specifications](#)



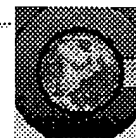
[E-Mail](#)



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**Center for Health Effects of Environmental Contamination**

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**Chloramine decomposition product studies**

*Investigators:* RL Valentine, M St. Clair, Department of Civil and Environmental Engineering, The University of Iowa

Monochloramine ( $\text{NH}_2\text{Cl}$ ) produced from the reaction of free chlorine and ammonia in a process called chloramination, is generally considered to be a leading candidate as an alternative disinfectant to replace free chlorine which is known to produce a variety of potentially mutagenic and carcinogenic organic by-products. However, while chloramination produces fewer organic byproducts, recent work has shown that at least one unidentified inorganic decomposition product is formed. The existence of an unidentified product should be a cause of concern because of potential health effects. This research focus on the characterization, identification, and quantification of the unknown(s) produced in chloraminated drinking water under a variety of reaction conditions. This will be done by 1) conducting detailed mass balances on chlorine and nitrogen, 2) developing methodology to separate and concentrate the unknown(s), and 3) applying mass spectrometry and NMR techniques to characterize structure. Expanded research is being funded by a grant from AWWARF.



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960416/ [webmaster@www.cheec.uiowa.edu](mailto:webmaster@www.cheec.uiowa.edu)

# Silver Nitrate

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## *Silver Nitrate*

By Dick Sullivan

Silver nitrate should never be mixed with ammonia compounds as it can form azides which are powerful explosives. Silver nitrate is an oxidizer and should be treated as such. Never mix with finely particulated metals such as aluminum or zinc. Also avoid contact with organics.

Silver nitrate stains skin and can even cause burns. Keep away from anything you do not wish to see stained black. The material does not at first stain, it is just absorbed into the skin. Later, exposure to light causes it to darken and then turn jet black. For years Bostick would never let me forget the big black stain in our porcelain kitchen sink, the ever-present reminder of an early Kallitype session.

If you get silver nitrate on your skin the obvious thing is to rinse immediately in plenty of water. Rubbing with some common kitchen salt (sodium chloride) will help. In most cases this will usually suffice. If the concentration of the silver nitrate is not strong, and it hasn't been on too long, there may be no staining. If so, then the harm done is mostly cosmetic. Frequently, however, one does not know about the contamination until it starts to darken from the light.

Stains can be removed from some materials with a permanganate and bisulfite treatment. It will vary in effectiveness depending on the material, of course. Wash the material in potassium permanganate, of 1 teaspoon to a pint of water. The material will turn dark red brown. This can be a little unsettling. Using 1 teaspoon of sodium bisulfite to a pint of water, rinse the material in this and the red color will immediately and completely disappear. There may be a slight release of sulfur dioxide gas, which is pungent, so this should be done in a ventilated area. I probably could have removed the stain in our sink had I know about this treatment.

This treatment was used in the past to remove stains from skin as well. Though there appears to be no harm from this treatment, Bostick & Sullivan does not recommend it.

MSDS for SILVER NITRATE

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SILVER NITRATE  
FORMULA:  $\text{AgNO}_3$   
FORMULA WT: 169.87  
CAS NO.: 07761-88-8  
NIOSH/RTECS NO.: VW4725000  
COMMON SYNONYMS: NITRIC ACID, SILVER(I) SALT; LUNAR CAUSTIC  
PRODUCT CODES: 3429, 3426  
EFFECTIVE: 10/11/85  
REVISION #01

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	3	SEVERE (OXIDIZER)
CONTACT	-	3	SEVERE (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## POISON DANGER

STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE  
MAY BE FATAL IF SWALLOWED  
CAUSES BURNS

KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT  
STORE NEAR COMBUSTIBLE MATERIALS. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
AVOID BREATHING DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, SOAK WITH WATER.  
IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL AREA WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
SILVER NITRATE	90-100	7761-88-8

## 3 - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MM HG): N/A

MSDS for SILVER NITRATE

Page 2

MELTING POINT: 212 C ( 414 F)

VAPOR DENSITY (AIR=1): 5.8

SPECIFIC GRAVITY: 4.35  
(H2O=1)

EVAPORATION RATE: N/A  
(BUTYL ACETATE=1)

SOLUBILITY (H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: COLORLESS, ODORLESS, TRANSPARENT CRYSTALS.

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#### 4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP N/A

NFPA 704M RATING: 1-0-0

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA  
USE WATER SPRAY.

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

#### UNUSUAL FIRE & EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

TOXIC GASES PRODUCED  
NITROGEN OXIDES

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#### 5 - HEALTH HAZARD DATA

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THRESHOLD LIMIT VALUE (TLV/TWA): 0.1 MG/M3 ( PPM)

TOXICITY: LD50 (ORAL-MOUSE) (MG/KG) - 50  
LD50 (IPR-MOUSE) (MG/KG) - 22

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

#### EFFECTS OF OVEREXPOSURE

CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.  
EXCESSIVE INHALATION OF DUST IS IRRITATING AND MAY BE SEVERELY DAMAGING TO RESPIRATORY PASSAGES AND/OR LUNGS.  
INGESTION MAY BE FATAL.

TARGET ORGANS  
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE  
NONE IDENTIFIED

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MSDS for SILVER NITRATE

Page 3

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ROUTES OF ENTRY  
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES  
CALL A PHYSICIAN.



STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT

INCOMPATIBLES: COMBUSTIBLE MATERIALS, STRONG REDUCING AGENTS

DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

## 8 - PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A HIGH-EFFICIENCY PARTICULATE RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

## 9 - STORAGE AND HANDLING PRECAUTIONS

Page 4

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE  
AND COMBUSTIBLE MATERIALS.  
KEEP CONTAINERS OUT OF SUN AND AWAY FROM HEAT.

## 3 of 4

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	SILVER NITRATE
HAZARD CLASS	OXIDIZER
UN/NA	UN1493
LABELS	OXIDIZER
REPORTABLE QUANTITY	1 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	SILVER NITRATE
HAZARD CLASS	5.1
UN/NA	UN1493
LABELS	OXIDIZING AGENT

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CHLORAMINE-T, TRIHYDRATE  
FORMULA: 1-CH3C6H4-4-SO2NCLNA 3H2O  
FORMULA WT: 281.69  
CAS NO.: 00127-65-1  
NIOSH/RTECS NO.: XT5617000  
COMMON SYNONYMS: SODIUM P-TOLUENESULFONCHLORAMIDE, TRIHYDRATE  
PRODUCT CODES: E494  
EFFECTIVE: 02/06/87  
REVISION #02

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (LIFE)  
FLAMMABILITY - 1 SLIGHT  
REACTIVITY - 2 MODERATE  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

CAUSES IRRITATION  
HARMFUL IF INHALED

LABORATORY TEST RESULTS INDICATE MATERIAL MAY BE MUTAGENIC.

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
CHLORAMINE-T, TRIHYDRATE	90-100	127-65-1

## 3 - PHYSICAL DATA

BOILING POINT: N/A VAPOR PRESSURE (MM HG): N/A  
MELTING POINT: N/A VAPOR DENSITY (AIR=1): 0.6

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 2

SPECIFIC GRAVITY: 1.43 EVAPORATION RATE: N/A  
(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY (H<sub>2</sub>O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: 0  
APPEARANCE & ODOR: WHITE TO YELLOW CRYSTALLINE POWDER WITH MILD CHLORINE ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP: 192 C ( 378 F)

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.  
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.  
CHLORAMINE T HAS BEEN REPORTED TO BE EXPLOSIVE IN NATURE WHEN AZEOTROPIC DISTILLATION WAS USED TO MAKE THE PRODUCT ANHYDROUS.

TOXIC GASES PRODUCED

CHLORINE, SULFUR DIOXIDE, NITROGEN OXIDES,  
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

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THIS SUBSTANCE IS LISTED AS ONE WHICH MAY BE REASONABLY ANTICIPATED TO BE A MUTAGEN.

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF DUST MAY CAUSE HEADACHE, COUGHING, DIFFICULTY IN BREATHING, CHEST PAIN, SEVERE LUNG IRRITATION, OR PULMONARY EDEMA.  
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.  
PROLONGED CONTACT MAY CAUSE SKIN SENSITIZATION.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

ASTHMA

ROUTES OF ENTRY

INHALATION, SKIN CONTACT, EYE CONTACT

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MSDS for CHLORAMINE-T, TRIHYDRATE

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Page 3

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.  
IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.  
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.



DOMESTIC (D.O.T.)

PROPER SHIPPING NAME      CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME      CHEMICALS, N.O.S. (NON-REGULATED)

# **EXHIBIT 6**

☐ Citation 1**Unique Identifier**

68136258

**Authors**Phillips I. Lobo AZ. Fernandes R. Gundara NS.**Title**Acetic acid in the treatment of superficial wounds infected by *Pseudomonas aeruginosa*.**Source**

Lancet. 1(7532):11-4, 1968 Jan 6.

**Abbreviated Source**

Lancet. 1(7532):11-4, 1968 Jan 6.

**NLM Journal Code**

l0s

**Journal Subset**

A

**Country of Publication**

England

**MeSH Subject Headings**\*Acetic Acids / tu [Therapeutic Use]Anti-Infective Agents, Local / tu [Therapeutic Use]Burns / dt [Drug Therapy]HumanOcclusive DressingsPseudomonas aeruginosa / gd [Growth & Development]\*Pseudomonas Infections / dt [Drug Therapy]\*Wound Infection / dt [Drug Therapy]Wound Infection / mi [Microbiology]**ISSN**

0140-6736

**Publication Type**

Clinical Trial. Journal Article. Randomized Controlled Trial.

**Language**

English

**Entry Month**

6805.





Complete record☐ Citation 30**Unique Identifier**

94346150

**Authors**Krasil'nikov AP. Gudkova EI.**Title**

[The sensitivity of enterobacteria to disinfectants]. [Russian]

**Source**

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (5):22-8, 1993 Sep-Oct.

**Abstract**

The presence of variants resistant to disinfectants in the natural populations has been established by original methods and with the use of a complex of indices. The occurrence, levels and spectra of acquired resistance depend on the type of a disinfecting agent and the habitat of bacteria. The study substantiates the necessity for surveillance on resistance to disinfectants, carried out with the use of universal methods and indices, available to practical laboratories and based on a more rational approach to the choice of disinfectants.



[Complete record](#)☐ Citation 36**Unique Identifier**

92057320

**Authors**Krasil'nikov AP. Adarchenko AA. Bulai PI. Sobeshchuk OP.**Title**

[A comparative analysis of the antibacterial activity of antiseptics and antibiotics on samples of *Pseudomonas aeruginosa*]. [Russian]

**Source**

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (8):30-3, 1991 Aug.

**Abstract**

Antibiotic and antiseptic preparations, currently used in medical practice, have been tested on the same *P. aeruginosa* samples and compared by the amplitude of their minimal inhibiting concentration (MIC) values, determined as the average MIC values for the samples under test, by the proportion of variants resistant to the tested preparations, by the distribution of strains in the resistance spectrum, and by the pace of the increase of resistant variants under natural conditions in 5-10 years. On the basis of the results obtained in this study a conclusion has been made that in some cases of local application antiseptic preparations have advantages over antibiotics, especially in controlling hospital strains of microorganisms. The authors believe that the heterogeneity of microbial populations, as well as the frequency of the appearance of resistant variants and the activity of the mechanisms of their selection in hospitals, is of great importance in the development of new preparations, in the re-evaluation of currently used preparations and in the choice of the optimum preparation in concrete situations.



Complete record☐ Citation 37**Unique Identifier**

91221838

**Authors**Adarchenko AA. Krasil'nikov AP. Sobeshchuk OP.**Title**

[Comparative study of the effect of antibiotics and antiseptics on Staphylococcus aureus]. [Russian]

**Source**

Antibiotiki i Khimioterapiia. 36(2):21-4, 1991 Feb.

**Abstract**

The routinely used antibiotics and antiseptics were compared with the same staphylococcal isolates by MIC ranges, the mean MIC for the strains, proportion of the variants resistant to the drugs, distribution of the strains by the resistance spectra and the number increase rate for the resistant variants in natural populations within 5-10-year periods. It was concluded that when used locally the antiseptics had some advantages over the antibiotics especially with respect to hospital strains. The authors believe that in developing new drugs, ++re-estimation of the routinely used ones, choosing the optimal drug for a particular case it is more important to consider the heterogeneity of microbial populations, the frequency of resistant variants and activity of the mechanisms of their selection under hospital conditions.



Complete record☐ Citation 39**Unique Identifier**

90232943

**Authors**Adarchenko AA. Krasil'nikov AP. Sobeshchuk OP.**Title**

[An evaluation of the sensitivity to antiseptic preparations of clinical strains of microorganisms in the family Enterobacteriaceae]. [Russian]

**Source**

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (1):23-8, 1990 Jan.

**Abstract**

Classical enterobacterial strains are sensitive to the working concentrations of pervomur, dioxydine, resorcinol, sodium sulfacyl, iodopyrone, chlorhexidine and boric acid, resistant to the action of cetylpyridinium chloride, rivanol, roccal and ethonium. In enterobacterial populations strains with acquired resistance to chloramine B, iodopyrone, chlorhexidine and resorcinol are present. Hospital strains of enterobacteria are characterized by higher, in comparison with extrahospital strains, resistance to ethonium, sodium sulfacyl, iodopyrone, chloramine B and resorcinol.



Complete record☐ Citation 40**Unique Identifier**

90197348

**Authors**Adarchenko AA. Krasil'nikov AP. Sobeshchuk OP.**Title**[Antiseptic sensitivity of clinical strains of *Pseudomonas aeruginosa*]. [Russian]**Source**

Antibiotiki i Khimioterapiia. 34(12):902-7, 1989 Dec.

**Abstract**

MICs, the frequency of clinical and statistic resistance and the antiseptic activity index were studied in complex on out-of-hospital and hospital ecovars of *P. aeruginosa*. The forms resistant to a number of antiseptics, i.e. chloramine B, chlorhexidine, decamethoxine and dioxidine whose frequency eventually increased were shown to be widely distributed. The antiseptic sensitivity spectrum was more narrow and more heterogeneous than that of other bacteria, the heterogeneity level being dependent on the antiseptic type and bacterial ecovar. The activity of pervomur, phenol, resorcin and boric acid was higher against the clinical strains of *P. aeruginosa* while iodopyrin, sulfacetamide sodium and dioxidine were less active. The *P. aeruginosa* strains had natural resistance to cetylpyridinium chloride, rokkal, ethonium, sodium laurate and laurylsulfate and rivanol. It was recommended to assay antiseptic sensitivity of agents causing purulent inflammatory infections and to control circulation of antiseptic resistant variants of bacteria in hospitals.





Results of your search: **or/13-15**

Citations available: **11**

Citations displayed: **1-11**

### Citation 1

**Unique Identifier**

84252514

**Authors**

Molochko VA. Krylov IA. Krasil'nikov AP. Lastochkina TM.

**Title**

[Immunogenicity of inactivated *Klebsiella ozaenae* cultures in relation to the properties and methods of culturing and preserving the initial strains]. [Russian]

**Source**

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (5):99-103, 1984 May.

**Abstract**

Experiments in the active protection of mice from generalized *K. ozaenae* infection have demonstrated that the heat-killed cultures of *K. ozaenae* capsular strains (antigens 02B : K4) possess pronounced and stable immunogenic properties, dependent on the presence and type of the capsular antigen and independent of the virulence and age of the initial strain, as well as the time and methods of its cultivation (the type of the culture medium: nutrient agar, glucose-mineral medium) and storage (the term of observation is 2 years). This investigation has resulted in the determination of the strain (2211) with the highest and most stable protective properties and in the selection of the optimum conditions for the immunization of mice (by the subcutaneous injection of 250 microbial bodies per mouse) with its heat-killed culture.

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### Citation 2

**Unique Identifier**

93360216

**Authors**

Sloss JM. Cumberland N. Milner SM.

**Institution**

Department of Pathology, Queen Elizabeth Military Hospital Woolwich, London.

**Title**

Acetic acid used for the elimination of *Pseudomonas aeruginosa* from burn and soft tissue wounds [see comments].

**Comments**

Comment in: J R Army Med Corps 1993 Oct;139(3):139

**Source**

Journal of the Royal Army Medical Corps. 139(2):49-51, 1993 Jun.

**Abstract**

Acetic acid was used topically at concentrations of between 0.5% and 5% to eliminate *Pseudomonas aeruginosa* from the burn wounds or soft tissue wounds of 16 patients. In-vitro studies indicated the susceptibility of *P. aeruginosa* to acetic acid; all strains exhibited a minimum inhibitory concentration of 2 per cent. *P. aeruginosa* was eliminated from the wounds of 14 of the 16 patients within two

weeks of treatment. Acetic acid was shown to be an inexpensive and efficient agent for the elimination of *P. aeruginosa* from burn and soft tissue wounds.

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### Citation 3

**Unique Identifier**

94346150

**Authors**Krasil'nikov AP. Gudkova EI.**Title**

[The sensitivity of enterobacteria to disinfectants]. [Russian]

**Source**

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (5):22-8, 1993 Sep-Oct.

**Abstract**

The presence of variants resistant to disinfectants in the natural populations has been established by original methods and with the use of a complex of indices. The occurrence, levels and spectra of acquired resistance depend on the type of a disinfecting agent and the habitat of bacteria. The study substantiates the necessity for surveillance on resistance to disinfectants, carried out with the use of universal methods and indices, available to practical laboratories and based on a more rational approach to the choice of disinfectants.

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### Citation 4

**Unique Identifier**

94063559

**Authors**Gudkova EI. Krasilnikov AP.**Title**[Spreading of *Pseudomonas* spp resistant to disinfectants]. [Russian]**Source**

Gigiena i Sanitariia. (8):62-5, 1993 Aug.

---

### Citation 5

**Unique Identifier**

93074216

**Authors**Krasil'nikov AP. Adarchenko AA.**Title**

[The clinical significance and methodological problems in determining bacterial sensitivity/resistance to antiseptics]. [Russian]

**Source**

Antibiotiki i Khimioterapiia. 37(9):39-44, 1992 Sep.

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### Citation 6

**Unique Identifier**

91342190

**Authors**Gudkova EI. Krasil'nikov AP.**Title**

[Control of microbial contamination of antiseptics and disinfectant solutions]. [Russian]

**Source**

Laboratornoe Delo. (1):59-61, 1991.

**Abstract**

Since various species of opportunistic and pathogenic bacteria and fungi are known to be present in working solutions of disinfectants and antiseptics, an original method for the detection of bacterial contamination of these solutions has been developed. This method has been introduced into practical activities of sanitary and epidemiologic stations and hospitals in Byelorussia as the principal element of sanitary inspection of antiseptic and disinfectant utilization.

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**Citation 7****Unique Identifier**

92057320

**Authors**Krasil'nikov AP. Adarchenko AA. Bulai PI. Sobeshchuk OP.**Title**[A comparative analysis of the antibacterial activity of antiseptics and antibiotics on samples of *Pseudomonas aeruginosa*]. [Russian]**Source**

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (8):30-3, 1991 Aug.

**Abstract**

Antibiotic and antiseptic preparations, currently used in medical practice, have been tested on the same *P. aeruginosa* samples and compared by the amplitude of their minimal inhibiting concentration (MIC) values, determined as the average MIC values for the samples under test, by the proportion of variants resistant to the tested preparations, by the distribution of strains in the resistance spectrum, and by the pace of the increase of resistant variants under natural conditions in 5-10 years. On the basis of the results obtained in this study a conclusion has been made that in some cases of local application antiseptic preparations have advantages over antibiotics, especially in controlling hospital strains of microorganisms. The authors believe that the heterogeneity of microbial populations, as well as the frequency of the appearance of resistant variants and the activity of the mechanisms of their selection in hospitals, is of great importance in the development of new preparations, in the re-evaluation of currently used preparations and in the choice of the optimum preparation in concrete situations.

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**Citation 8****Unique Identifier**

91221838

**Authors**Adarchenko AA. Krasil'nikov AP. Sobeshchuk OP.





Results of your search: from 7 [limit 6 to (human and english language)] keep 8,10-11,18,20

Citations available: 5

Citations displayed: 1-5

### Citation 1

**Unique Identifier**

98085888

**Authors**

Ohnishi K. Yoshioka H. Ito S. Fujiwara K.

**Institution**

Third Department of Medicine, Saitama Medical School, Japan.

**Title**

Prospective randomized controlled trial comparing percutaneous **acetic acid** injection and percutaneous ethanol injection for small hepatocellular carcinoma.

**Source**

Hepatology. 27(1):67-72, 1998 Jan.

**Abstract**

To assess whether ultrasound-guided percutaneous **acetic acid** injection is superior to percutaneous ethanol injection in the treatment of small hepatocellular carcinoma (HCC), 60 patients with one to four HCCs smaller than 3 cm were entered onto a randomized controlled trial. Thirty-one and 29 patients, respectively, were treated by percutaneous **acetic acid** injection using 50% **acetic acid** or by percutaneous ethanol injection using absolute ethanol. There were no significant differences in age, sex ratio, Child-Pugh class, size of tumors, or number of tumors between the two groups. When there was no evidence of viable HCC from biopsy, plain and helical dynamic computed tomography, or angiography, the treatment was considered successful and was discontinued. All original tumors were treated successfully by either therapy. However, 8% of 38 tumors treated with percutaneous **acetic acid** injection and 37% of 35 tumors treated with percutaneous ethanol injection developed a local recurrence ( $P < .001$ ) during the follow-up periods of 29 +/- 8 months and 23 +/- 10 months, respectively. The 1- and 2-year survival rates were 100% and 92% in percutaneous **acetic acid** injection and 83% and 63% in percutaneous ethanol injection ( $P = .0017$ ). A multivariate analysis of prognostic factors revealed that treatment was an independent predictor of survival. The risk ratio of percutaneous **acetic acid** injection versus percutaneous ethanol injection was 0.120 (range, 0.027-0.528;  $P = .0050$ ). In conclusion, percutaneous **acetic acid** injection is superior to percutaneous ethanol injection in the treatment of small HCC.

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### Citation 2

**Unique Identifier**

97265542

**Authors**

Perron M. Malouin F.

**Institution**

Clinique de Physiotherapie de Charny, Canada.

**Title**

**Acetic acid** iontophoresis and ultrasound for the treatment of calcifying tendinitis of the shoulder: a

randomized control trial.

**Source**

Archives of Physical Medicine & Rehabilitation. 78(4):379-84, 1997 Apr.

**Abstract**

**OBJECTIVE:** To assess the effects of **acetic acid** iontophoresis (AAI) and ultrasound on calcifying tendinitis of the shoulder, and to determine the relation between changes in the radiological measures of calcium deposit (CD) and shoulder function.

**DESIGN:** Randomized control trial.

**SETTING:** General community, private practice.

**PATIENTS:** Twenty-two adults (7 men, 15 women) with a calcifying tendinitis of the shoulder, without associated conditions, stratified according to the type of lesions (X-ray: type I, fleecy appearance: type II, homogeneous), were randomly allocated to an experimental (EXP, n = 11) or to a control (CTL, n = 10) group.

**INTERVENTIONS:** CTL group, no treatment; EXP group, nine treatments including AAI (5% **acetic acid** solution via the negative electrode, 5mA galvanic current, 20 minutes) followed by continuous ultrasound (0.8w/cm<sup>2</sup>, 1MHz, 5 minutes).

**MAIN OUTCOME MEASURES:** Area and density of the CD, passive shoulder abduction (range of motion [ROM]), pain intensity.

**RESULTS:** Significant reduction in the area and density of CD (ANCOVA, p = .01 and .03) over time in the EXP and CTL groups, but no significant difference between groups for any of the variables measured. The decrease in the area of CD in type I lesions (n = 5) was larger (Mann-Whitney U test, p < .01) than in type II (n = 16) lesions. The relation was stronger (rs = .90) between changes in area and density of CD than between ROM and pain (rs = -.67). Correlations were weak (rs = .21 to .41) between radiological and functional changes.

**CONCLUSION:** The reduction in CD area and density likely results from a natural process rather than treatment (AAI and ultrasound); type I lesions (resorptive phase) are more likely to display resorption of the CD than type II lesions (formative phase). Reduction of the CD area does not necessary result in a functional improvement.

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**Citation 3****Unique Identifier**

97397668

**Authors**

Nagoba BS. Deshmukh SR. Wadher BJ. Patil SB.

**Title**

**Acetic acid treatment of pseudomonal postoperative wound infection [letter].**

**Source**

Journal of Hospital Infection. 36(3):243-4, 1997 Jul.

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**Citation 4****Unique Identifier**

97102749

**Authors**

Ohnishi K. Yoshioka H. Kosaka K. Toshima K. Nishiyama J. Kameda C. Ito S. Fujiwara K.

**Institution**

Third Department of Medicine, Saitama Medical School, Japan.

**Title**

Treatment of hypervascular small hepatocellular carcinoma with ultrasound-guided percutaneous **acetic acid** injection: comparison with segmental transcatheter arterial embolization.

**Source**

American Journal of Gastroenterology. 91(12):2574-9, 1996 Dec.

**Abstract**

**OBJECTIVE:** To compare the efficacy of ultrasound-guided percutaneous **acetic acid** injection and segmental transcatheter arterial embolization for hypervascular small hepatocellular carcinoma.

**METHODS:** The prognosis of 40 patients with one to three angiographically hypervascular hepatocellular carcinoma smaller than 3 cm in diameter treated with either percutaneous **acetic acid** injection (25 patients) or transcatheter arterial embolization (15 patients) during the past 4.5 yr were analyzed retrospectively.

**RESULTS:** After initial therapy, none of 25 patients treated with percutaneous **acetic acid** injection developed ascites, whereas 5 of 15 (33%) patients treated with transcatheter arterial embolization developed it ( $p < 0.01$ ). All tumors became smaller once after each therapy. However, local recurrence (reenlargement of the original tumor) occurred in 1 of 29 (3%) tumors treated with percutaneous **acetic acid** injection and 11 of 22 (50%) tumors treated with transcatheter arterial embolization ( $p < 0.005$ ). During the follow-up, 4 of 25 (16%) patients treated with percutaneous **acetic acid** injection and 10 of 15 (67%) patients treated with transcatheter arterial embolization died. The 1-, 2-, and 3-yr survival rate was 100, 94, and 83%, respectively, in patients treated with percutaneous **acetic acid** injection and 72, 65, and 39% in patients treated with transcatheter arterial embolization ( $p < 0.005$ ). The cancer-free survival rate was also significantly better in the former than in the latter group ( $p < 0.005$ ).

**CONCLUSIONS:** Percutaneous **acetic acid** injection is superior to segmental transcatheter arterial embolization in the treatment of hypervascular small hepatocellular carcinoma.

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**Citation 5****Unique Identifier**

97019629

**Authors**

Lawless HT. Horne J. Giasi P.

**Institution**

Department of Food Science, Cornell University, Ithaca, NY 14853, USA.

**Title**

Astringency of organic **acids** is related to pH.

**Source**

Chemical Senses. 21(4):397-403, 1996 Aug.

**Abstract**

Astringency and sourness of lactic, **acetic** and citric **acids**, each adjusted to pH 3, 5 and 7, were evaluated in two experiments, one starting at equal concentrations in wt/vol before neutralization and the second starting at equal molarity. Astringency and sourness decreased with increasing pH. However, **acids** were differentially sour at equal pH, consistent with previous findings. In contrast, the tactile attributes associated with astringency (drying, roughing of oral tissues and puckery/tightening sensations) were similar across **acids**; pH was the major influence on astringency. Strong dependence on pH suggests that astringency of these **acids** is a direct result of their **acidic** properties, and not solely due to the hydrogen bonding mechanisms previously suggested as an

explanation of astringency in tannin interactions with salivary proteins.

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Results of your search: **from 9 [antipseudomonal agents.ti,ab,rw,sh.] keep 4-6**

Citations available: **3**

Citations displayed: **1-3**

### Citation 1

**Unique Identifier**

96104010

**Authors**

Murase M. Miyamoto H. Handa T. Saheki S. Takeuchi N.

**Institution**

Clinical Laboratories, Ehime University Hospital.

**Title**

[Activities of **antipseudomonal agents** against clinical isolates of *Pseudomonas aeruginosa*].  
[Japanese]

**Source**

Japanese Journal of Antibiotics. 48(10):1581-9, 1995 Oct.

**Abstract**

Using clinically isolated 114 strains of *Pseudomonas aeruginosa* that were collected from April to October 1994, activity of **antipseudomonal agents** against these organisms was determined using the method of liquid microdilution. In addition, antimicrobial activities of the **agents** were graded according to serological groups of organisms. The results of this study are summarized as follows. 1. Many strains of *P. aeruginosa* were isolated mainly from sputum, pus and urine. 2. Serological group G organisms of sputum origin, group I of pus and bile origin, and group E of urine origin were isolated most frequently. 3. The most powerful **antipseudomonal agent** was cefclidin. Its MIC50 and MIC90 were 0.78 and 6.25 micrograms/ml, respectively. The second most powerful agent was ciprofloxacin whose MIC50 and MIC90 were 0.39 and 12.5 micrograms/ml, respectively. 4. The proportions of resistant strains ranged from 0.9% for cefclidin to 40.4% for ofloxacin. The **antipseudomonal agents** to which 30% or more of strains were resistant were ceftazidime, gentamicin and ofloxacin. 5. Cefclidin showed the most powerful activity against strains that were resistant to ceftazidime, imipenem, gentamicin and ofloxacin. Its MIC90 against all strains resistant to ceftazidime, gentamicin and ofloxacin was 6.25 micrograms/ml. The MIC90 of cefclidin and tobramycin against imipenem-resistant strains was 3.13 micrograms/ml. 6. Group E organisms were found among strains resistant to ceftazidime, gentamicin and ofloxacin at high rates, but no group E strains were found among imipenem-resistant organisms. 7. **Agents** with highest activities by serological group of organisms were cefclidin against group A, tobramycin and ciprofloxacin against group B, imipenem against group E, ciprofloxacin against group G, and cefclidin and ciprofloxacin against group I. (ABSTRACT TRUNCATED AT 250 WORDS)

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### Citation 2

**Unique Identifier**

96058514

**Authors**

Gerceker AA. Otuk G.

**Institution**

Department of Pharmaceutical Microbiology, Faculty of Pharmacy, University of Istanbul, Turkey.

**Title**

Comparison of imipenem and five other **antipseudomonal agents** against gentamicin-susceptible and -resistant *Pseudomonas aeruginosa*.

**Source**

Chemotherapy. 41(5):334-6, 1995 Sep-Oct.

**Abstract**

The in vitro activities of imipenem, aztreonam, piperacillin, ciprofloxacin and amikacin were tested by the microbroth dilution technique against 86 clinical isolates of *Pseudomonas aeruginosa*. Imipenem and ciprofloxacin were the most active **agents** against gentamicin-susceptible *P. aeruginosa*. Only imipenem inhibited gentamicin-resistant *P. aeruginosa* at  $\leq 8$  micrograms/ml. The finding that none of the gentamicin-resistant strains were resistant to imipenem and amikacin indicated the superiority of these antibiotics to the other **agents** in hospital-associated gentamicin-resistant *P. aeruginosa* infections.

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**Citation 3****Unique Identifier**

96058512

**Authors**

Dan M. Zabeeda D. Poch F.

**Institution**

Infectious Disease Unit, E. Wolfson Hospital, Holon, Israel.

**Title**

Comparative serum bactericidal activity against *Pseudomonas aeruginosa* of six **antipseudomonal agents**.

**Source**

Chemotherapy. 41(5):323-9, 1995 Sep-Oct.

**Abstract**

Serum levels and serum bactericidal activities of six **antipseudomonal agents** were studied comparatively in 60 patients. Single intravenous doses of gentamicin (1.5 mg/kg), piperacillin (4 g), ceftazidime (1 g), imipenem (0.5 g), aztreonam (1 g), and ciprofloxacin (200 mg) were given over 30 min to 10 patients each, and serum samples were obtained 30 min, 1, 2, 3, 4, 6, 8 and 12 h after beginning the infusion. Serum bactericidal activity was determined by the broth microdilution method against 10 recent isolates of *Pseudomonas aeruginosa*. Mean peak serum levels were as follows: gentamicin 10.4 micrograms/ml, piperacillin 227.5 micrograms/ml, ceftazidime 43.5 micrograms/ml, imipenem 17.3 micrograms/ml, aztreonam 42.3 micrograms/ml, and ciprofloxacin 3.9 micrograms/ml. All **agents** demonstrated effective serum bactericidal activity (geometric mean titer  $> 1:2$ ) at peak serum levels. Ceftazidime was by far the most potent compound with a mean titer of 1:46.5, followed by ciprofloxacin (1:17), imipenem (1:13.7), and aztreonam (1:13.4). Ceftazidime also showed the longest duration of activity with a mean titer of 1:5.1 at 4 h. Based on our results, ceftazidime appeared to be the most potent **antipseudomonal agent**, while gentamicin and piperacillin were the least effective.



# **EXHIBIT 7**

MSDS for ACETIC ACID, GLACIAL

Page 1

*corrosive  
burns  
ch. over exposure → lung damage*

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: ACETIC ACID, GLACIAL  
 FORMULA: CH<sub>3</sub>COOH  
 FORMULA WT: 60.05  
 CAS NO.: 64-19-7  
 NIOSH/RTECS NO.: AF1225000  
 COMMON SYNONYMS: ETHANOIC ACID; METHANE CARBOXYLIC ACID; ETHYLIC ACID  
 PRODUCT CODES: 9506, 9522, 9524, 9503, 9501, 9508, 9507, 5355, 9520, 9511, 4803, 9515  
 9500  
 EFFECTIVE: 08/28/86  
 REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
 FLAMMABILITY - 2 MODERATE  
 REACTIVITY - 2 MODERATE  
 CONTACT - 3 SEVERE (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

DANGER  
 COMBUSTIBLE

CAUSES SEVERE BURNS

HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL, OR CARBON DIOXIDE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ACETIC ACID, GLACIAL	90-100	64-19-7

3 - PHYSICAL DATA

MSDS for ACETIC ACID, GLACIAL

Page 2

BOILING POINT: 118 C ( 244 F) VAPOR PRESSURE (MM HG): 11



MELTING POINT: 17 C ( 63 F) VAPOR DENSITY(AIR=1): 2.1  
SPECIFIC GRAVITY: 1.05 EVAPORATION RATE: 0.97  
(H2O=1) (BUTYL ACETATE=1)  
SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 100  
APPEARANCE & ODOR: COLORLESS LIQUID WITH STRONG VINEGAR-LIKE ODOR.

---

#### 4 - FIRE AND EXPLOSION HAZARD DATA

---

FLASH POINT (CLOSED CUP: 39 C ( 103 F) NFPA 704M RATING: 2-2-1  
FLAMMABLE LIMITS: UPPER - 19.9 % LOWER - 4.0 %

#### FIRE EXTINGUISHING MEDIA

USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

#### UNUSUAL FIRE & EXPLOSION HAZARDS

GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR.  
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.  
CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE OR EXPLOSION.

#### TOXIC GASES PRODUCED

ACETIC ACID, CARBON MONOXIDE, CARBON DIOXIDE

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#### 5 - HEALTH HAZARD DATA

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THRESHOLD LIMIT VALUE (TLV/TWA): 25 MG/M3 ( 10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 37 MG/M3 ( 15 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 25 MG/M3 ( 10 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 3310  
LD50 (IV-MOUSE) (MG/KG) - 525  
LD50 (SKIN-RABBIT) (MG/KG) - 1060  
LC50 (INHL-MOUSE) (PPM) - 5620

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

---

MSDS for ACETIC ACID, GLACIAL

Page 3

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#### EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY SYSTEM.  
LIQUID MAY CAUSE SEVERE BURNS TO SKIN AND EYES.  
LIQUID MAY CAUSE PERMANENT EYE DAMAGE.  
INGESTION MAY CAUSE SEVERE BURNING OF MOUTH AND STOMACH.  
INGESTION MAY CAUSE NAUSEA, VOMITING AND LOSS OF CONSCIOUSNESS.  
CHRONIC OVEREXPOSURE MAY RESULT IN LUNG DAMAGE.

TARGET ORGANS

RESPIRATORY SYSTEM, EYES, SKIN, TEETH

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, INGESTION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

WASH CLOTHING BEFORE RE-USE.

---

6 - REACTIVITY DATA

---

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES:

STRONG OXIDIZING AGENTS,  
MOST COMMON METALS (EXCEPT ALUMINUM), CHROMIC ACID,  
NITRIC ACID, HYDROGEN PEROXIDE,  
ALKALIES, CARBONATES, STRONG BASES, AMINES,  
SULFURIC ACID

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

---

7 - SPILL AND DISPOSAL PROCEDURES

---

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.  
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. STOP  
LEAK IF YOU CAN DO SO WITHOUT RISK. NEUTRALIZE SPILL WITH SODA ASH OR  
LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY  
CONTAINER AND COVER. REMOVE FROM SPILL AREA. FLUSH AREA WITH WATER.

J. T. BAKER NEUTRASORB(R) OR NEUTRASOL(R) "LOW NA+" ACID NEUTRALIZERS  
ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

---

MSDS for ACETIC ACID, GLACIAL

Page 4

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DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL  
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER:

D001, D002 (IGNITABLE, CORROSIVE WASTE)

---

8 - PROTECTIVE EQUIPMENT

---

VENTILATION:

USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET

TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 500 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID/ORGANIC CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, ACID-RESISTANT GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS  
-----

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA OR CABINET.

-----  
10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION  
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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	ACETIC ACID, GLACIAL
HAZARD CLASS	CORROSIVE MATERIAL (LIQUID)
UN/NA	UN2789
LABELS	CORROSIVE
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	ACETIC ACID, GLACIAL
HAZARD CLASS	8
UN/NA	UN2789
LABELS	CORROSIVE, FLAMMABLE LIQUID

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CHLORAMINE-T, TRIHYDRATE  
FORMULA: 1-CH<sub>3</sub>C<sub>6</sub>H<sub>4</sub>-4-SO<sub>2</sub>NCLNA 3H<sub>2</sub>O  
FORMULA WT: 281.69  
CAS NO.: 00127-65-1  
NIOSH/RTECS NO.: XT5617000  
COMMON SYNONYMS: SODIUM P-TOLUENESULFONCHLORAMIDE, TRIHYDRATE  
PRODUCT CODES: E494  
EFFECTIVE: 02/06/87  
REVISION #02

*may be  
mutagen  
pulm. edema  
skin irritation*

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (LIFE)  
FLAMMABILITY - 1 SLIGHT  
REACTIVITY - 2 MODERATE  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

CAUSES IRRITATION

HARMFUL IF INHALED

LABORATORY TEST RESULTS INDICATE MATERIAL MAY BE MUTAGENIC.

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
CHLORAMINE-T, TRIHYDRATE	90-100	127-65-1

## 3 - PHYSICAL DATA

BOILING POINT: N/A VAPOR PRESSURE (MM HG): N/A  
MELTING POINT: N/A VAPOR DENSITY (AIR=1): 0.6

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 2

SPECIFIC GRAVITY: 1.43 EVAPORATION RATE: N/A  
(H<sub>2</sub>O=1) (BUTYL ACETATE=1)

SOLUBILITY (H<sub>2</sub>O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: WHITE TO YELLOW CRYSTALLINE POWDER WITH MILD CHLORINE ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP: 192 C ( 378 F)

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.  
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.  
CHLORAMINE T HAS BEEN REPORTED TO BE EXPLOSIVE IN NATURE WHEN AZEOTROPIC DISTILLATION WAS USED TO MAKE THE PRODUCT ANHYDROUS.

TOXIC GASES PRODUCED

CHLORINE, SULFUR DIOXIDE, NITROGEN OXIDES,  
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

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THIS SUBSTANCE IS LISTED AS ONE WHICH MAY BE REASONABLY ANTICIPATED TO BE A MUTAGEN.

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF DUST MAY CAUSE HEADACHE, COUGHING, DIFFICULTY IN BREATHING, CHEST PAIN, SEVERE LUNG IRRITATION, OR PULMONARY EDEMA.  
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.  
PROLONGED CONTACT MAY CAUSE SKIN SENSITIZATION.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE  
ASTHMA

ROUTES OF ENTRY

INHALATION, SKIN CONTACT, EYE CONTACT

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MSDS for CHLORAMINE-T, TRIHYDRATE

Page 3

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EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.  
IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.  
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.



DOMESTIC (D.O.T.)

PROPER SHIPPING NAME      CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME      CHEMICALS, N.O.S. (NON-REGULATED)

MSDS for PHENOL

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: PHENOL  
FORMULA: C6H5OH  
FORMULA WT: 94.11  
CAS NO.: 00108-95-2  
NIOSH/RTECS NO.: SJ3325000  
COMMON SYNONYMS: CARBOLIC ACID; HYDROXYBENZENE; MONOHYDROXYBENZENE; PHENIC ACID; PHENYLIC ACID  
PRODUCT CODES: 2858, 2862  
EFFECTIVE: 01/22/87  
REVISION #04

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (LIFE)  
FLAMMABILITY - 2 MODERATE  
REACTIVITY - 1 SLIGHT  
CONTACT - 4 EXTREME (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

\*\* CODE NOT ON FILE \*\*

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER  
COMBUSTIBLE

CAUSES SEVERE BURNS - RAPIDLY ABSORBED THROUGH SKIN

MAY BE FATAL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN

EXCEPTIONAL HEALTH AND CONTACT HAZARDS - READ MATERIAL SAFETY DATA SHEET  
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, SOAK WITH  
WATER. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL AREA WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
PHENOL	90-100	108-95-2

## 3 - PHYSICAL DATA

BOILING POINT: 182 C ( 360 F) VAPOR PRESSURE (MM HG): 0.35

MSDS for PHENOL

Page 2

MELTING POINT: 40 C ( 104 F) VAPOR DENSITY (AIR=1): 3.24

severe irritation/burn  
"poison"



SPECIFIC GRAVITY: 1.07  
(H2O=1)

EVAPORATION RATE: <1  
(BUTYL ACETATE=1)

SOLUBILITY (H2O): MODERATE (1 TO 10 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS CRYSTALS; CHARACTERISTIC ODOR.

---

#### 4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP) 79 C ( 175 F) NFPA 704M RATING: 3-2-0

FLAMMABLE LIMITS: UPPER - 8.6 % LOWER - 1.5 %

#### FIRE EXTINGUISHING MEDIA

USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

#### UNUSUAL FIRE & EXPLOSION HAZARDS

GIVES OFF HEAVY SMOKE.

GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

#### TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

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#### 5 - HEALTH HAZARD DATA

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TLV AND PEL LISTED DENOTE (SKIN).

THRESHOLD LIMIT VALUE (TLV/TWA): 19 MG/M3 ( 5 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 38 MG/M3 ( 10 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 19 MG/M3 ( 5 PPM)

TOXICITY:	LD50 (ORAL-RAT) (MG/KG)	-	384
	LD50 (SKN-RAT) (MG/KG)	-	669
	LD50 (IPR-RAT) (MG/KG)	-	250
	LC50 (INHL-RAT) (MG/KG)	-	316

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

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MSDS for PHENOL

Page 3

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#### EFFECTS OF OVEREXPOSURE

ACUTE POISONING VIA ALL ROUTES OF EXPOSURE MAY BE SEVERE ENOUGH TO BE FATAL.

INHALATION OF DUST MAY CAUSE HEADACHE, COUGHING, DIFFICULTY IN BREATHING, CHEST PAIN, SEVERE LUNG IRRITATION, OR PULMONARY EDEMA.

CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.

SUBSTANCE IS READILY ABSORBED THROUGH THE SKIN.  
INGESTION MAY CAUSE NAUSEA, VOMITING, GASTROINTESTINAL IRRITATION, AND  
BURNS TO MOUTH AND THROAT.  
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

KIDNEY DISORDERS

ROUTES OF ENTRY

INHALATION, ABSORPTION, INHALATION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR  
MILK OF MAGNESIA.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL  
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR  
AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

WASH CLOTHING BEFORE RE-USE.

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6 - REACTIVITY DATA  
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STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION, LIGHT, AIR

INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG BASES, ALKALIES,  
CALCIUM HYPOCHLORITE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE  
-----

7 - SPILL AND DISPOSAL PROCEDURES  
-----

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. WITH  
CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER;  
REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL  
ENVIRONMENTAL REGULATIONS.

MSDS for PHENOL

Page 4

EPA HAZARDOUS WASTE NUMBER: U188 (TOXIC WASTE)  
-----

8 - PROTECTIVE EQUIPMENT  
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VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET  
TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE

CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 50 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, VITON GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

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SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA OR CABINET.  
STORE IN LIGHT-RESISTANT CONTAINERS.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	PHENOL
HAZARD CLASS	POISON B
UN/NA	UN1671
LABELS	POISON
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	PHENOLS
HAZARD CLASS	6.1
UN/NA	UN1671
LABELS	POISON

MSDS for BORIC ACID

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BORIC ACID  
FORMULA: H3BO3  
FORMULA WT: 61.83  
CAS NO.: 10043-35-3  
NIOSH/RTECS NO.: ED4550000  
COMMON SYNONYMS: BORACIC ACID; ORTHOBORIC ACID; BOROFAX  
PRODUCT CODES: 0084, 5168, 0090, 0091, 9820  
EFFECTIVE: 10/03/86  
REVISION #02

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
FLAMMABILITY - 0 NONE  
REACTIVITY - 0 NONE  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

## CAUSES IRRITATION

HARMFUL IF SWALLOWED OR ABSORBED THROUGH SKIN

AVOID CONTACT WITH EYES, SKIN, CLOTHING.

AVOID BREATHING DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
BORIC ACID	90-100	10043-35-3

## 3 - PHYSICAL DATA

BOILING POINT:	N/A	VAPOR PRESSURE (MM HG):	15
MELTING POINT:	171 C ( 340 F)	VAPOR DENSITY (AIR=1):	N/A
SPECIFIC GRAVITY:	1.44	EVAPORATION RATE:	N/A

MSDS for BORIC ACID

Page 2

(H2O=1)

(BUTYL ACETATE=1)

SOLUBILITY(H<sub>2</sub>O): MODERATE (1 TO 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: COLORLESS, ODORLESS SOLID.

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4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP: N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

TOXIC GASES PRODUCED

OXIDES

---

5 - HEALTH HAZARD DATA

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TOXICITY:	LD50 (ORAL-RAT) (MG/KG)	-	2660
	LD50 (SCU-RAT) (MG/KG)	-	1400
	LD50 (IV-RAT) (MG/KG)	-	1330

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INGESTION IS HARMFUL AND MAY BE FATAL.

DUST INHALATION MAY CAUSE TIGHTNESS AND PAIN IN CHEST, COUGHING, AND DIFFICULTY IN BREATHING.

CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.

PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,

GASTROINTESTINAL IRRITATION.

CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

DAMAGED SKIN

ROUTES OF ENTRY

INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

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MSDS for BORIC ACID

Page 3

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IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

## 6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE, HEAT

INCOMPATIBLES: POTASSIUM METAL, WATER, STRONG BASES

DECOMPOSITION PRODUCTS: OXIDES

## 7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE  
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.  
WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND  
COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

## DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

## 8 - PROTECTIVE EQUIPMENT

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, RUBBER GLOVES ARE RECOMMENDED.

## 9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA (TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

### SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

## 10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

MSDS for BORIC ACID

Page 4

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME                      CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME                      CHEMICALS, N.O.S. (NON-REGULATED)

MSDS for POTASSIUM PERMANGANATE

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: POTASSIUM PERMANGANATE  
FORMULA: KMNO4  
FORMULA WT: 158.04  
CAS NO.: 07722-64-7  
NIOSH/RTECS NO.: SD6475000  
COMMON SYNONYMS: PERMANGANIC ACID, POTASSIUM SALT  
PRODUCT CODES: 3228, 3227, 3232  
EFFECTIVE: 11/25/86  
REVISION #03

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	3	SEVERE (OXIDIZER)
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## DANGER

## CAUSES IRRITATION

## HARMFUL IF SWALLOWED OR INHALED

STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE  
KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT  
STORE NEAR COMBUSTIBLE MATERIALS. AVOID CONTACT WITH EYES, SKIN, CLOTHING.  
KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING. IN CASE  
OF FIRE, SOAK WITH WATER. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL  
AREA WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
POTASSIUM PERMANGANATE	90-100	7722-64-7

## 3 - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MM HG): N/A

MSDS for POTASSIUM PERMANGANATE

Page 2

MELTING POINT: 150 C ( 302 F) DECOMPOSES VAPOR DENSITY (AIR=1): 5.40

SPECIFIC GRAVITY: 2.70  
(H2O=1)

EVAPORATION RATE: N/A  
(BUTYL ACETATE=1)

SOLUBILITY (H2O): MODERATE (1 TO 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: DARK PURPLE TO BRONZE CRYSTALS WITH NO ODOR.

---

#### 4 - FIRE AND EXPLOSION HAZARD DATA

---

FLASH POINT (CLOSED CUP N/A

NEPA 704M RATING: 1-0-0 OXY

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA  
USE WATER SPRAY.

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

#### UNUSUAL FIRE & EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

---

#### 5 - HEALTH HAZARD DATA

---

PEL AND TEL VALUES ARE LISTED FOR MANGANESE.

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3 ( PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3 ( PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 1090  
LD50 (SCU-MOUSE) (MG/KG) - 500

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

#### EFFECTS OF OVEREXPOSURE

EXCESSIVE INHALATION OF DUST IS IRRITATING AND MAY BE SEVERELY DAMAGING TO RESPIRATORY PASSAGES AND/OR LUNGS.  
CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.  
SUBSTANCE IS READILY ABSORBED THROUGH THE SKIN.  
INGESTION MAY CAUSE NAUSEA, VOMITING, GASTROINTESTINAL IRRITATION, AND BURNS TO MOUTH AND THROAT.  
PROLONGED INHALATION OF MANGANESE IN THE FORM OF ITS INORGANIC COMPOUNDS MAY CAUSE MANGANISM.

#### TARGET ORGANS

RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM, BLOOD, KIDNEYS

---

MSDS for POTASSIUM PERMANGANATE

Page 3

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MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE  
DAMAGED SKIN

#### ROUTES OF ENTRY

INGESTION, INHALATION



#### EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. FOLLOW WITH DILUTED VINEGAR, FRUIT JUICE OR WHITES OF EGGS, BEATEN WITH WATER.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

PEL AND TLV LISTED DENOTE CEILING LIMIT.

---

#### 6 - REACTIVITY DATA

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STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT

INCOMPATIBLES: ORGANIC MATERIALS, COMBUSTIBLE MATERIALS,  
STRONG REDUCING AGENTS, STRONG ACIDS, PEROXIDES,  
ALCOHOLS, CHEMICALLY ACTIVE METALS

---

#### 7 - SPILL AND DISPOSAL PROCEDURES

---

##### STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

##### DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001 (IGNITABLE WASTE)

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#### 8 - PROTECTIVE EQUIPMENT

---

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

---

MSDS for POTASSIUM PERMANGANATE

Page 4

---

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, BUTYL RUBBER GLOVES ARE RECOMMENDED.

-----  
9 - STORAGE AND HANDLING PRECAUTIONS  
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SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE  
AND COMBUSTIBLE MATERIALS.

-----  
10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION  
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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	POTASSIUM PERMANGANATE
HAZARD CLASS	OXIDIZER
UN/NA	UN1490
LABELS	OXIDIZER
REPORTABLE QUANTITY	100 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	POTASSIUM PERMANGANATE
HAZARD CLASS	5.1
UN/NA	UN1490
LABELS	OXIDIZING AGENT

MSDS for RESORCINOL

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: RESORCINOL  
FORMULA: 1,3-(HO)2C6H4  
FORMULA WT: 110.11  
CAS NO.: 00108-46-3  
NIOSH/RTECS NO.: VG9625000  
COMMON SYNONYMS: RESORCIN; M-DIHYDROXYBENZENE  
PRODUCT CODES: 3368, 3360, 3366  
EFFECTIVE: 10/04/85  
REVISION #01

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
FLAMMABILITY - 2 MODERATE  
REACTIVITY - 1 SLIGHT  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

HARMFUL IF SWALLOWED OR ABSORBED THROUGH SKIN

CAUSES IRRITATION

COMBUSTIBLE

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING.  
KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING. IN  
CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY  
BE INEFFECTIVE. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL AREA  
WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
RESORCINOL, CRYSTAL	90-100	108-46-3

## 3 - PHYSICAL DATA

BOILING POINT: 281 C ( 538 F) VAPOR PRESSURE (MM HG): N/A

MSDS for RESORCINOL

Page 2

MELTING POINT: 111 C ( 232 F) VAPOR DENSITY (AIR=1): 3.8

SPECIFIC GRAVITY: 1.27  
(H2O=1)

EVAPORATION RATE: N/A  
(BUTYL ACETATE=1)

SOLUBILITY (H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: N/A

APPEARANCE & ODOR: WHITE CRYSTALS OR POWDER; PINK IF EXPOSED TO LIGHT OR AIR.

---

#### 4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: -1-0

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

#### FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.  
(WATER MAY BE INEFFECTIVE.)

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

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#### 5 - HEALTH HAZARD DATA

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THRESHOLD LIMIT VALUE (TLV/TWA): 45 MG/M3 ( 10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 90 MG/M3 ( 20 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 301  
LD50 (SKIN-RABBIT) (MG/KG) - 3360

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

#### EFFECTS OF OVEREXPOSURE

DUST MAY CAUSE HEADACHE, COUGHING, DIZZINESS OR DIFFICULT BREATHING.

#### TARGET ORGANS

NONE IDENTIFIED

#### MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

#### ROUTES OF ENTRY

NONE INDICATED

#### EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

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MSDS for RESORCINOL

Page 3

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IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.  
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

---

#### 6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.  
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. WITH  
CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER;  
REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL  
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U201 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET  
TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE  
CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS  
ABOVE 10 PPM, A SELF-CONTAINED BREATHING  
APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, RUBBER  
GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

KEEP PRODUCT OUT OF LIGHT.  
KEEP CONTAINER TIGHTLY CLOSED. STORE IN COOL, DRY, WELL-VENTILATED AREA  
AWAY FROM HEAT, SPARKS, OR FLAME.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

MSDS for RESORCINOL

Page 4

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	RESORCINOL
HAZARD CLASS	ORM-E
UN/NA	UN2876
LABELS	NONE
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	RESORCINOL
HAZARD CLASS	6.1
UN/NA	UN2876
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

MSDS for RESORCINOL

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: RESORCINOL  
FORMULA: 1,3-(HO)2C6H4  
FORMULA WT: 110.11  
CAS NO.: 00108-46-3  
NIOSH/RTECS NO.: VG9625000  
COMMON SYNONYMS: RESORCIN; M-DIHYDROXYBENZENE  
PRODUCT CODES: 3368, 3360, 3366  
EFFECTIVE: 10/04/85  
REVISION #01

For DR. RAAD

From  
Tanya

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
FLAMMABILITY - 2 MODERATE  
REACTIVITY - 1 SLIGHT  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

HARMFUL IF SWALLOWED OR ABSORBED THROUGH SKIN

CAUSES IRRITATION

COMBUSTIBLE

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING.  
KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING. IN  
CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY  
BE INEFFECTIVE. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL AREA  
WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
RESORCINOL, CRYSTAL	90-100	108-46-3

## 3 - PHYSICAL DATA

BOILING POINT: 281 C ( 538 F) VAPOR PRESSURE (MM HG): N/A

MSDS for RESORCINOL

Page 2

MELTING POINT: 111 C ( 232 F) VAPOR DENSITY (AIR=1): 3.8

SPECIFIC GRAVITY: 1.27  
(H<sub>2</sub>O=1)

EVAPORATION RATE: N/A  
(BUTYL ACETATE=1)

SOLUBILITY (H<sub>2</sub>O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: N/A

APPEARANCE & ODOR: WHITE CRYSTALS OR POWDER; PINK IF EXPOSED TO LIGHT OR AIR.

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4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP N/A

NFPA 704M RATING: -1-0

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.  
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

---

5 - HEALTH HAZARD DATA

---

THRESHOLD LIMIT VALUE (TLV/TWA): 45 MG/M3 ( 10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 90 MG/M3 ( 20 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 301  
LD50 (SKIN-RABBIT) (MG/KG) - 3360

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

DUST MAY CAUSE HEADACHE, COUGHING, DIZZINESS OR DIFFICULT BREATHING.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

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MSDS for RESORCINOL

Page 3

---

IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

---

6 - REACTIVITY DATA



STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	RESORCINOL
HAZARD CLASS	6.1
UN/NA	UN2876
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

MSDS for PHENOL

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: PHENOL  
FORMULA: C6H5OH  
FORMULA WT: 94.11  
CAS NO.: 00108-95-2  
NIOSH/RTECS NO.: SJ3325000  
COMMON SYNONYMS: CARBOLIC ACID; HYDROXYBENZENE; MONOHYDROXYBENZENE; PHENIC  
ACID; PHENYLIC ACID  
PRODUCT CODES: 2858, 2862  
EFFECTIVE: 01/22/87  
REVISION #04

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (LIFE)  
FLAMMABILITY - 2 MODERATE  
REACTIVITY - 1 SLIGHT  
CONTACT - 4 EXTREME (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

\*\* CODE NOT ON FILE \*\*

PRECAUTIONARY LABEL STATEMENTS

## POISON DANGER

## COMBUSTIBLE

CAUSES SEVERE BURNS - RAPIDLY ABSORBED THROUGH SKIN

MAY BE FATAL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN

EXCEPTIONAL HEALTH AND CONTACT HAZARDS - READ MATERIAL SAFETY DATA SHEET  
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, SOAK WITH  
WATER. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL AREA WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY).

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
PHENOL	90-100	108-95-2

## 3 - PHYSICAL DATA

BOILING POINT: 182 C ( 360 F) VAPOR PRESSURE (MM HG): 0.35

MSDS for PHENOL

Page 2

MELTING POINT: 40 C ( 104 F) VAPOR DENSITY (AIR=1): 3.24

SPECIFIC GRAVITY: 1.07  
(H<sub>2</sub>O=1)

EVAPORATION RATE: <1  
(BUTYL ACETATE=1)

SOLUBILITY (H<sub>2</sub>O): MODERATE (1 TO 10 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS CRYSTALS; CHARACTERISTIC ODOR.

---

#### 4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP 79 °C ( 175 °F) NFPA 704M RATING: 3-2-0

FLAMMABLE LIMITS: UPPER - 8.6 % LOWER - 1.5 %

#### FIRE EXTINGUISHING MEDIA

USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

#### UNUSUAL FIRE & EXPLOSION HAZARDS

GIVES OFF HEAVY SMOKE.

GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

#### TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

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#### 5 - HEALTH HAZARD DATA

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TLV AND PEL LISTED DENOTE (SKIN).

THRESHOLD LIMIT VALUE (TLV/TWA): 19 MG/M<sup>3</sup> ( 5 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 38 MG/M<sup>3</sup> ( 10 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 19 MG/M<sup>3</sup> ( 5 PPM)

TOXICITY:	LD <sub>50</sub> (ORAL-RAT) (MG/KG)	-	384
	LD <sub>50</sub> (SKN-RAT) (MG/KG)	-	669
	LD <sub>50</sub> (IPR-RAT) (MG/KG)	-	250
	LC <sub>50</sub> (INHL-RAT) (MG/KG)	-	316

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

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MSDS for PHENOL

Page 3

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#### EFFECTS OF OVEREXPOSURE

ACUTE POISONING VIA ALL ROUTES OF EXPOSURE MAY BE SEVERE ENOUGH TO BE FATAL.

INHALATION OF DUST MAY CAUSE HEADACHE, COUGHING, DIFFICULTY IN BREATHING, CHEST PAIN, SEVERE LUNG IRRITATION, OR PULMONARY EDEMA.

CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.

SUBSTANCE IS READILY ABSORBED THROUGH THE SKIN.  
INGESTION MAY CAUSE NAUSEA, VOMITING, GASTROINTESTINAL IRRITATION, AND  
BURNS TO MOUTH AND THROAT.  
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

KIDNEY DISORDERS

ROUTES OF ENTRY

INHALATION, ABSORPTION, INHALATION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR  
MILK OF MAGNESIA.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL  
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR  
AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

WASH CLOTHING BEFORE RE-USE.

-----  
6 - REACTIVITY DATA  
-----

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION, LIGHT, AIR

INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG BASES, ALKALIES,  
CALCIUM HYPOCHLORITE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

-----  
7 - SPILL AND DISPOSAL PROCEDURES  
-----

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. WITH  
CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER;  
REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL  
ENVIRONMENTAL REGULATIONS.

MSDS for PHENOL

Page 4

EPA HAZARDOUS WASTE NUMBER: U188 (TOXIC WASTE)

-----  
8 - PROTECTIVE EQUIPMENT  
-----

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET  
TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE

CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 50 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, VITON GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

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SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA OR CABINET.  
STORE IN LIGHT-RESISTANT CONTAINERS.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	PHENOL
HAZARD CLASS	POISON B
UN/NA	UN1671
LABELS	POISON
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	PHENOLS
HAZARD CLASS	6.1
UN/NA	UN1671
LABELS	POISON

MSDS for BORIC ACID

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BORIC ACID  
FORMULA: H3BO3  
FORMULA WT: 61.83  
CAS NO.: 10043-35-3  
NIOSH/RTECS NO.: ED4550000  
COMMON SYNONYMS: BORACIC ACID; ORTHOBORIC ACID; BOROFAX  
PRODUCT CODES: 0084, 5168, 0090, 0091, 9820  
EFFECTIVE: 10/03/86  
REVISION #02

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
FLAMMABILITY - 0 NONE  
REACTIVITY - 0 NONE  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

## CAUSES IRRITATION

HARMFUL IF SWALLOWED OR ABSORBED THROUGH SKIN

AVOID CONTACT WITH EYES, SKIN, CLOTHING.

AVOID BREATHING DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
BORIC ACID	90-100	10043-35-3

## 3 - PHYSICAL DATA

BOILING POINT: N/A	VAPOR PRESSURE (MM HG): 15
MELTING POINT: 171 C ( 340 F)	VAPOR DENSITY (AIR=1): N/A
SPECIFIC GRAVITY: 1.44	EVAPORATION RATE: N/A

MSDS for BORIC ACID

Page 2

(H2O=1)

(BUTYL ACETATE=1)

SOLUBILITY(H<sub>2</sub>O): MODERATE (1 TO 10 %)

% VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: COLORLESS, ODORLESS SOLID.

---

#### 4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP: N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

TOXIC GASES PRODUCED

OXIDES

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#### 5 - HEALTH HAZARD DATA

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TOXICITY:	LD50 (ORAL-RAT) (MG/KG)	-	2660
	LD50 (SCU-RAT) (MG/KG)	-	1400
	LD50 (IV-RAT) (MG/KG)	-	1330

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INGESTION IS HARMFUL AND MAY BE FATAL.

DUST INHALATION MAY CAUSE TIGHTNESS AND PAIN IN CHEST, COUGHING, AND DIFFICULTY IN BREATHING.

CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.

PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.

CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

DAMAGED SKIN

ROUTES OF ENTRY

INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

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MSDS for BORIC ACID

Page 3

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IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.





MSDS for POTASSIUM PERMANGANATE

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: POTASSIUM PERMANGANATE  
FORMULA: KMNO4  
FORMULA WT: 158.04  
CAS NO.: 07722-64-7  
NIOSH/RTECS NO.: SD6475000  
COMMON SYNONYMS: PERMANGANIC ACID, POTASSIUM SALT  
PRODUCT CODES: 3228, 3227, 3232  
EFFECTIVE: 11/25/86  
REVISION #03

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
FLAMMABILITY - 0 NONE  
REACTIVITY - 3 SEVERE (OXIDIZER)  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## DANGER

## CAUSES IRRITATION

## HARMFUL IF SWALLOWED OR INHALED

STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE  
KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT  
STORE NEAR COMBUSTIBLE MATERIALS. AVOID CONTACT WITH EYES, SKIN, CLOTHING.  
KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING. IN CASE  
OF FIRE, SOAK WITH WATER. IN CASE OF SPILL, SWEEP UP AND REMOVE. FLUSH SPILL  
AREA WITH WATER.

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
POTASSIUM PERMANGANATE	90-100	7722-64-7

## 3 - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MM HG): N/A

MSDS for POTASSIUM PERMANGANATE

Page 2

MELTING POINT: 150 C ( 302 F) DECOMPOSES VAPOR DENSITY (AIR=1): 5.40

SPECIFIC GRAVITY: 2.70  
(H<sub>2</sub>O=1)

EVAPORATION RATE: N/A  
(BUTYL ACETATE=1)

SOLUBILITY (H<sub>2</sub>O): MODERATE (1 TO 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: DARK PURPLE TO BRONZE CRYSTALS WITH NO ODOR.

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#### 4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 1-0-0 OXY

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA  
USE WATER SPRAY.

#### SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

#### UNUSUAL FIRE & EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

---

#### 5 - HEALTH HAZARD DATA

---

PEL AND TEL VALUES ARE LISTED FOR MANGANESE.

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3 ( PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3 ( PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 1090  
LD50 (SCU-MOUSE) (MG/KG) - 500

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

#### EFFECTS OF OVEREXPOSURE

EXCESSIVE INHALATION OF DUST IS IRRITATING AND MAY BE SEVERELY DAMAGING TO RESPIRATORY PASSAGES AND/OR LUNGS.  
CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.  
SUBSTANCE IS READILY ABSORBED THROUGH THE SKIN.  
INGESTION MAY CAUSE NAUSEA, VOMITING, GASTROINTESTINAL IRRITATION, AND BURNS TO MOUTH AND THROAT.  
PROLONGED INHALATION OF MANGANESE IN THE FORM OF ITS INORGANIC COMPOUNDS MAY CAUSE MANGANISM.

#### TARGET ORGANS

RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM, BLOOD, KIDNEYS

---

MSDS for POTASSIUM PERMANGANATE

Page 3

---

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE  
DAMAGED SKIN

#### ROUTES OF ENTRY

INGESTION, INHALATION

#### EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. FOLLOW WITH DILUTED VINEGAR, FRUIT JUICE OR WHITES OF EGGS, BEATEN WITH WATER.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

PEL AND TLV LISTED DENOTE CEILING LIMIT.

---

#### 6 - REACTIVITY DATA

---

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT

INCOMPATIBLES: ORGANIC MATERIALS, COMBUSTIBLE MATERIALS,  
STRONG REDUCING AGENTS, STRONG ACIDS, PEROXIDES,  
ALCOHOLS, CHEMICALLY ACTIVE METALS

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#### 7 - SPILL AND DISPOSAL PROCEDURES

---

##### STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

##### DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001 (IGNITABLE WASTE)

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#### 8 - PROTECTIVE EQUIPMENT

---

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

---

MSDS for POTASSIUM PERMANGANATE

Page 4

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RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, BUTYL RUBBER GLOVES ARE RECOMMENDED.

---

9 - STORAGE AND HANDLING PRECAUTIONS

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SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE  
AND COMBUSTIBLE MATERIALS.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	POTASSIUM PERMANGANATE
HAZARD CLASS	OXIDIZER
UN/NA	UN1490
LABELS	OXIDIZER
REPORTABLE QUANTITY	100 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	POTASSIUM PERMANGANATE
HAZARD CLASS	5.1
UN/NA	UN1490
LABELS	OXIDIZING AGENT

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CHLORAMINE-T, TRIHYDRATE  
FORMULA: 1-CH<sub>3</sub>C<sub>6</sub>H<sub>4</sub>-4-SO<sub>2</sub>NCLNA 3H<sub>2</sub>O  
FORMULA WT: 281.69  
CAS NO.: 00127-65-1  
NIOSH/RTECS NO.: XT5617000  
COMMON SYNONYMS: SODIUM P-TOLUENESULFONCHLORAMIDE, TRIHYDRATE  
PRODUCT CODES: E494  
EFFECTIVE: 02/06/87  
REVISION #02

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (LIFE)  
FLAMMABILITY - 1 SLIGHT  
REACTIVITY - 2 MODERATE  
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

## PRECAUTIONARY LABEL STATEMENTS

## WARNING

CAUSES IRRITATION  
HARMFUL IF INHALED

LABORATORY TEST RESULTS INDICATE MATERIAL MAY BE MUTAGENIC.  
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
CHLORAMINE-T, TRIHYDRATE	90-100	127-65-1

## 3 - PHYSICAL DATA

BOILING POINT: N/A VAPOR PRESSURE (MM HG): N/A  
MELTING POINT: N/A VAPOR DENSITY (AIR=1): 0.6

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 2

SPECIFIC GRAVITY: 1.43 EVAPORATION RATE: N/A  
(H<sub>2</sub>O=1) (BUTYL ACETATE=1)

SOLUBILITY (H<sub>2</sub>O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: WHITE TO YELLOW CRYSTALLINE POWDER WITH MILD CHLORINE ODOR.

---

4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP: 192 C ( 378 F)

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.  
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.  
CHLORAMINE T HAS BEEN REPORTED TO BE EXPLOSIVE IN NATURE WHEN AZEOTROPIC DISTILLATION WAS USED TO MAKE THE PRODUCT ANHYDROUS.

TOXIC GASES PRODUCED

CHLORINE, SULFUR DIOXIDE, NITROGEN OXIDES,  
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

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THIS SUBSTANCE IS LISTED AS ONE WHICH MAY BE REASONABLY ANTICIPATED TO BE A. MUTAGEN.

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF DUST MAY CAUSE HEADACHE, COUGHING, DIFFICULTY IN BREATHING, CHEST PAIN, SEVERE LUNG IRRITATION, OR PULMONARY EDEMA.  
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.  
PROLONGED CONTACT MAY CAUSE SKIN SENSITIZATION.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

ASTHMA

ROUTES OF ENTRY

INHALATION, SKIN CONTACT, EYE CONTACT

---

MSDS for CHLORAMINE-T, TRIHYDRATE

Page 3

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EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.





DOMESTIC (D.O.T.)

PROPER SHIPPING NAME      CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME      CHEMICALS, N.O.S. (NON-REGULATED)

MSDS for ACETIC ACID, GLACIAL

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: ACETIC ACID, GLACIAL  
FORMULA: CH<sub>3</sub>COOH  
FORMULA WT: 60.05  
CAS NO.: 64-19-7  
NIOSH/RTECS NO.: AF1225000  
COMMON SYNONYMS: ETHANOIC ACID; METHANE CARBOXYLIC ACID; ETHYLIC ACID  
PRODUCT CODES: 9506, 9522, 9524, 9503, 9501, 9508, 9507, 5355, 9520, 9511, 4803, 9515  
9500  
EFFECTIVE: 08/28/86  
REVISION #02

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE  
FLAMMABILITY - 2 MODERATE  
REACTIVITY - 2 MODERATE  
CONTACT - 3 SEVERE (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

## LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B  
EXTINGUISHER

## PRECAUTIONARY LABEL STATEMENTS

DANGER  
COMBUSTIBLE

CAUSES SEVERE BURNS

HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE  
VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE WATER SPRAY,  
ALCOHOL FOAM, DRY CHEMICAL, OR CARBON DIOXIDE. FLUSH SPILL AREA WITH WATER  
SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ACETIC ACID, GLACIAL	90-100	64-19-7

## 3 - PHYSICAL DATA

MSDS for ACETIC ACID, GLACIAL

Page 2

BOILING POINT: 118 C ( 244 F) VAPOR PRESSURE (MM HG): 11

MELTING POINT: 17 C ( 63 F) VAPOR DENSITY (AIR=1): 2.1  
SPECIFIC GRAVITY: 1.05 EVAPORATION RATE: 0.97  
(H2O=1) (BUTYL ACETATE=1)  
SOLUBILITY (H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 100  
APPEARANCE & ODOR: COLORLESS LIQUID WITH STRONG VINEGAR-LIKE ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP: 39 C ( 103 F) NFPA 704M RATING: 2-2-1

FLAMMABLE LIMITS: UPPER - 19.9 % LOWER - 4.0 %

FIRE EXTINGUISHING MEDIA

USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE OR EXPLOSION.

TOXIC GASES PRODUCED

ACETIC ACID, CARBON MONOXIDE, CARBON DIOXIDE

---

5 - HEALTH HAZARD DATA

---

THRESHOLD LIMIT VALUE (TLV/TWA): 25 MG/M3 ( 10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 37 MG/M3 ( 15 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 25 MG/M3 ( 10 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 3310  
LD50 (IV-MOUSE) (MG/KG) - 525  
LD50 (SKIN-RABBIT) (MG/KG) - 1060  
LC50 (INHL-MOUSE) (PPM) - 5620

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

---

MSDS for ACETIC ACID, GLACIAL

Page 3

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EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY SYSTEM.  
LIQUID MAY CAUSE SEVERE BURNS TO SKIN AND EYES.  
LIQUID MAY CAUSE PERMANENT EYE DAMAGE.  
INGESTION MAY CAUSE SEVERE BURNING OF MOUTH AND STOMACH.  
INGESTION MAY CAUSE NAUSEA, VOMITING AND LOSS OF CONSCIOUSNESS.  
CHRONIC OVEREXPOSURE MAY RESULT IN LUNG DAMAGE.

TARGET ORGANS

RESPIRATORY SYSTEM, EYES, SKIN, TEETH

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, INGESTION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

WASH CLOTHING BEFORE RE-USE.

---

6 - REACTIVITY DATA

---

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES:

STRONG OXIDIZING AGENTS,  
MOST COMMON METALS (EXCEPT ALUMINUM), CHROMIC ACID,  
NITRIC ACID, HYDROGEN PEROXIDE,  
ALKALIES, CARBONATES, STRONG BASES, AMINES,  
SULFURIC ACID

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

---

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.  
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. STOP  
LEAK IF YOU CAN DO SO WITHOUT RISK. NEUTRALIZE SPILL WITH SODA ASH OR  
LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY  
CONTAINER AND COVER. REMOVE FROM SPILL AREA. FLUSH AREA WITH WATER.

J. T. BAKER NEUTRASORB(R) OR NEUTRASOL(R) "LOW NA+" ACID NEUTRALIZERS  
ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

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MSDS for ACETIC ACID, GLACIAL

Page 4

---

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL  
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER:

D001, D002 (IGNITABLE, CORROSIVE WASTE)

---

8 - PROTECTIVE EQUIPMENT

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VENTILATION:

USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET

TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 500 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID/ORGANIC CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, ACID-RESISTANT GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS  
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SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA OR CABINET.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION  
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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	ACETIC ACID, GLACIAL
HAZARD CLASS	CORROSIVE MATERIAL (LIQUID)
UN/NA	UN2789
LABELS	CORROSIVE
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	ACETIC ACID, GLACIAL
HAZARD CLASS	8
UN/NA	UN2789
LABELS	CORROSIVE, FLAMMABLE LIQUID

# **EXHIBIT 8**



Results of your search : from 1 ["SILVER COATED CATHETERS".mp.] keep 1-3,5-7

Citations available: 6

Citations displayed: 1-6

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### Citation 1

**Unique Identifier**

98423949

**Authors**

[Saint S.](#) [Elmore JG.](#) [Sullivan SD.](#) [Emerson SS.](#) [Koepsell TD.](#)

**Institution**

Department of Medicine, University of Washington, Seattle, USA.

**Title**

The efficacy of **silver alloy-coated** urinary **catheters** in preventing urinary tract infection: a meta-analysis.

**Source**

American Journal of Medicine. 105(3):236-41, 1998 Sep.

**Abstract**

**PURPOSE:** Indwelling urinary **catheters** are implicated in most cases of nosocomial urinary tract infection. **Silver**-coating of **catheters** may reduce the risk of these infections; however, trials have provided mixed results. We performed a meta-analysis to estimate the effectiveness of **silver-coated** urinary **catheters**. **SUBJECTS AND METHODS:** Published or unpublished articles were sought using MEDLINE, reference review, and correspondence with original authors, catheter manufacturers, and experts. Trials using **silver-coated** urinary **catheters** in the treatment group and **uncoated** urinary **catheters** in the control group were included. Bacteriuria, as evaluated by urine culture, was the outcome variable used to indicate urinary tract infection. Summary odds ratios (OR) and 95% confidence intervals (CI) were calculated using Mantel-Haenszel methods with a fixed-effects model. **RESULTS:** Of 117 reports retrieved, eight trials with a total of 2,355 patients satisfied inclusion criteria. The summary OR for urinary tract infection was 0.59 (95% CI, 0.42 to 0.84) indicating a significant benefit in the patients receiving **silver-coated catheters**. A test of heterogeneity, however, indicated that the odds ratios varied significantly among studies. **Silver alloy catheters** (OR = 0.24; 95% CI, 0.11 to 0.52) were significantly more protective against bacteriuria than **silver oxide catheters** (OR = 0.79; 95% CI, 0.56 to 1.10). **CONCLUSIONS:** This meta-analysis clarifies discrepant results among trials of **silver-coated** urinary **catheters** by revealing that **silver alloy catheters** are significantly more effective in preventing urinary tract infections than are **silver oxide catheters**. Though **silver alloy** urinary **catheters** cost about \$6 more than standard urinary **catheters**, they may be worth the extra cost since catheter-related infection is a common cause of nosocomial infection and bacteremia.

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### Citation 2

**Unique Identifier**

98238361

**Authors**

Trerotola SO. Johnson MS. Shah H. Kraus MA. McKusky MA. Ambrosius WT. Harris VJ. Snidow JJ.

**Institution**

Department of Radiology, Indiana University School of Medicine, University Hospital, Indianapolis 46202-5253, USA.

**Title**

Tunneled hemodialysis **catheters**: use of a **silver-coated** catheter for prevention of infection--a randomized study.

**Source**

Radiology. 207(2):491-6, 1998 May.

**Abstract**

**PURPOSE:** To determine whether **silver-coated** tunneled hemodialysis **catheters** reduce infection and to determine the frequency of central venous thrombosis and stenosis with percutaneous placement of right internal jugular vein dialysis **catheters** by interventional radiologists. **MATERIALS AND METHODS:** Ninety-one patients were randomly assigned to a treatment (**silver-coated** catheter; n = 47) or control (identical catheter without **silver** coating; n = 44) arm. Baseline venography was performed. Catheter tips were cultured and venography was repeated at catheter removal. **RESULTS:** Mean duration of catheter placement was 92 days. Infection occurred in 11 patients (five in the treatment group, six in the control group). Tip cultures in 15 patients (eight treatment, seven control) were positive without clinical infection. Infection and colonization rates were slightly but not significantly higher in the treatment group than in the control group. **Silver-coated catheters** in two (4%) patients were removed due to reaction to the coating. Completion venograms (n = 72) showed new minor abnormalities in four (6%) patients and major abnormalities (stenosis, thrombosis) in three (4%) patients. Permanent venous abnormalities occurred in two (3%) patients. **CONCLUSION:** **Silver** coating does not confer a benefit against clinical infection or colonization. Interventional radiologic placement of tunneled dialysis **catheters** yields a low frequency of permanent central venous thrombosis and stenosis.

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**Citation 3****Unique Identifier**

98193439

**Authors**

Goldschmidt H. Salwender HJ. Hahn U. Hegenbart U. Egerer G. Wallmeier M. Jansen B. Haas R.

**Institution**

Department of Internal Medicine V, University of Heidelberg, Germany.

**Title**

Increased risk of catheter colonization and catheter-related infections in severe immunocompromized patients with multiple myeloma undergoing high-dose glucocorticoid treatment.

**Source**

Zentralblatt fur Bakteriologie. 287(1-2):125-34, 1998 Jan.



## Abstract

Catheter-related infections (CRI) are an important problem in medicine because of major consequences for treatment, prolongation of hospitalization and increasing therapy costs. Malignancies, immunodeficiency, severe burns and malnutrition compromise host defense. Studies to quantify the increased risk of CRI in immunocompromised patients are required. We analyzed the influence of immunoglobulin deficiency and high-dose glucocorticoid treatment in patients with multiple myeloma with regard to catheter colonization and CRI. In patients with multiple myeloma, central venous **catheters** (CVC) were significantly more frequently colonized (> 15 CFU) as compared to patients with other malignancies undergoing chemotherapy. We found a tendency towards a higher CRI rate in the myeloma patient group. Interestingly, despite of the significantly higher incidence of catheter colonization and a tendency towards higher CRI rates in severely immunocompromised patients, the incidence of signs of local (redness of the entry site) and systemic (fever) host reactions is reduced in myeloma patients. To decrease the CRI rate in myeloma patients during chemotherapy which includes high-dose glucocorticoids, we use antibacterial (**silver-coated catheters**).

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## Citation 4

### Unique Identifier

97019392

### Authors

Kathuria P. Moore HL. Mehrotra R. Prowant BF. Khanna R. Twardowski ZJ.

### Institution

University of Missouri-Columbia, USA.

### Title

Evaluation of healing and external tunnel histology of **silver-coated** peritoneal **catheters** in rats.

### Source

Advances in Peritoneal Dialysis. 12:203-8, 1996.

### Abstract

A previous study showed that **silver-coating** peritoneal **catheters** tended to decrease the incidence of early exit-site infections in rats. This study was designed to further evaluate the healing, biocompatibility, and external tunnel morphology of standard and **silver-coated catheters**. **Catheters** were **coated** with **silver** by an ion beam-assisted process. Fourteen male Sprague-Dawley rats underwent implantation of either a standard or **silver-coated** double-cuff peritoneal catheter. Weekly observation and photographs documented exit-site characteristics. Erythema, exudate, loose fit, and poor hair growth were evidence of an inflamed exit. Overt infection was indicated by the presence of three or more of the following: erythema, purulent exudate, exuberant granulation tissue, loose fit, and poor hair growth. Animals were sacrificed at six weeks, and **catheters** were removed and processed for histology of the external tunnel. Multiple measurements were taken using a Filar eyepiece, and data were expressed as a mean of several readings. Inflammation, vascularity, and fibrosis were judged semiquantitatively. At the end of six weeks, six of the seven exits of the **silver catheters** showed excellent healing, while one exit site had signs of excessive inflammation. Four of the exit sites of the standard **catheters** healed well, two were inflamed, and one was overtly infected. The sinus tract of the standard and **silver catheters** had similar

characteristics: keratinized and nonkeratinized epithelium lined the external part of the sinus tract and merged into granulation tissue. A fibrous sheath was noted in some sinus tracts between the granulation tissue and the cuff. The cuff evoked a foreign body reaction, with fibrosis, multiple giant cells, and vascularization. Poorly healing or infected sinus tracts had highly vascular granulation tissue with overlying exudate. The cuff of these **catheters** had marked inflammation and scanty giant cells, although collagen bundle thickness was similar to the well-healing **catheters**. In conclusion, **silver**-coating potentially enhances healing of the exit sites of peritoneal **catheters**. Additionally, the similarity of the tunnel histomorphology of standard and **silver catheters** confirms the favorable biocompatibility of **silver**.

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### Citation 5

**Unique Identifier**

97016708

**Authors**Fung LC. Khoury AE. Vas SI. Smith C. Oreopoulos DG. Mittelman MW.**Institution**

Department of Surgery, University of Toronto, Ontario, Canada.

**Title**Biocompatibility of **silver-coated**  
peritoneal dialysis catheter in a porcine model.**Source**

Peritoneal Dialysis International. 16(4):398-405, 1996 Jul-Aug.

**Abstract**

**OBJECTIVE:** Previous studies have shown that **silver** formulations **coated** onto implantable materials retard bacterial colonization and reduce the incidence of catheter-related infections. The objective of this study was to assess the histologic effects of sputter-coated **silver**/ silicone implants on host tissue. **DESIGN:** Sputter **silver-coated** silicone peritoneal dialysis catheter segments with and without Dacron cuffs were implanted in the subcutaneous fat and muscle in 4 pigs. **Noncoated** implants served as controls. The specimens were retrieved at 1, 2, 3, 4, 7, 8, 9, 10, 12, and 27 weeks. **EXPERIMENTAL ANIMALS:** Four 6-week-old male Yorkshire-Landrace pigs (5-6 kg) were used. **MAIN OUTCOME MEASURES:** Histologic parameters evaluated included the degree of inflammation, the number of giant cells, the extent of **silver** particulate inclusions, and the thickness of the capsules. All specimens were evaluated by a single blinded pathologist. Microbiologic analyses were also performed. **RESULTS:** The **silver-coated catheters** were associated with less inflammation than were the **noncoated catheters**, both in fat and muscle ( $p = 0.04$ ). The number of giant cells was also lower around the **silver-coated** than the **non-coated catheters**, which were implanted in subcutaneous fat ( $p < 0.05$ ). Particulate inclusions compatible with **silver** or **silver** oxide were observed only in tissue around **silver-coated** implants ( $p < 0.0001$ ). The thickness of the capsules and the extent of the inflammatory zones were not significantly different. There was no evidence of infection-related changes. **CONCLUSIONS:** These data suggest that the sputter **silver** coating does not act as a significant tissue irritant.

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## Citation 6

**Unique Identifier**

96092477

**Authors**Kathuria P. Moore HL. Prowant BF. Khanna R. Twardowski ZJ.**Institution**

University of Missouri-Columbia, USA.

**Title**Preliminary evaluation of **silver-coated**  
peritoneal **catheters** in rats.**Source**

Advances in Peritoneal Dialysis. 11:189-92, 1995.

**Abstract**

**Silver** is known to have powerful antibacterial properties against a variety of micro-organisms and has a low toxicity and a favorable biocompatibility profile. This study was designed to evaluate the effectiveness of **silver-coated catheters** in preventing early exit-site infection and to assess tunnel morphology. Seven male Sprague-Dawley rats underwent simultaneous implantation of two double-cuffed, **silver-coated** silicone rubber and standard silicone rubber **catheters**. Weekly observations and photographs documented exit-site characteristics. The animals were sacrificed and **catheters** removed and processed for histopathology of the external tunnel at 5 weeks. Exit sites of **silver-coated catheters** tended to have less inflammation and infection and healed better than those of **uncoated catheters**; however, these data did not achieve significance using the Wilcoxon signed-rank test. Sections of the external tunnel of well-healing exit sites showed an epithelialized tract with granulation tissue near the cuff and significant invasion of the external cuff by collagen with a mild neutrophilic inflammatory response. In contrast, the histology of the external tunnel of infected exits revealed exudate overlying inflammatory granulation tissue and a variable degree of fibrosis of the cuff. When the exit sites appeared similar, no significant histopathological differences in sinus tract and cuff morphology were noted with either **silver** or standard **catheters**. In conclusion, these findings suggest that **silver** coating of **catheters** may decrease the incidence of early exit-site infections and allow better ingrowth of the catheter.





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## Citation 2

### Unique Identifier

98238361

### Authors

[Trerotola SO.](#) [Johnson MS.](#) [Shah H.](#) [Kraus MA.](#) [McKusky MA.](#) [Ambrosius WT.](#) [Harris VJ.](#) [Snidow JJ.](#)

### Institution

Department of Radiology, Indiana University School of Medicine, University Hospital, Indianapolis 46202-5253, USA.

### Title

Tunneled hemodialysis **catheters**: use of a **silver-coated** catheter for prevention of infection--a randomized study.

### Source

Radiology. 207(2):491-6, 1998 May.

### Abstract

**PURPOSE:** To determine whether **silver-coated** tunneled hemodialysis **catheters** reduce infection and to determine the frequency of central venous thrombosis and stenosis with percutaneous placement of right internal jugular vein dialysis **catheters** by interventional radiologists.

**MATERIALS AND METHODS:** Ninety-one patients were randomly assigned to a treatment (**silver-coated** catheter; n = 47) or control (identical catheter without **silver** coating; n = 44) arm. Baseline venography was performed. Catheter tips were cultured and venography was repeated at catheter removal. **RESULTS:** Mean duration of catheter placement was 92 days. Infection occurred in 11 patients (five in the treatment group, six in the control group). Tip cultures in 15 patients (eight treatment, seven control) were positive without clinical infection. Infection and colonization rates were slightly but not significantly higher in the treatment group than in the control group.

**Silver-coated catheters** in two (4%) patients were removed due to reaction to the coating. Completion venograms (n = 72) showed new minor abnormalities in four (6%) patients and major abnormalities (stenosis, thrombosis) in three (4%) patients. Permanent venous abnormalities occurred in two (3%) patients. **CONCLUSION:** **Silver** coating does not confer a benefit against clinical infection or colonization. Interventional radiologic placement of tunneled dialysis **catheters** yields a low frequency of permanent central venous thrombosis and stenosis.





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### Citation 1

**Unique Identifier**

98111999

**Authors**

[Zhao G.](#) [Stevens SE Jr.](#)

**Institution**

Department of Microbiology and Molecular Cell Sciences, University of  
Memphis, TN 38152, USA.

**Title**

Multiple parameters for the comprehensive evaluation of the susceptibility of  
Escherichia coli to the **silver** ion.

**Source**

Biometals. 11(1):27-32, 1998 Jan.

**Abstract**

The susceptibility of Escherichia coli B to the antibacterial activity of **silver ions** was measured in terms of the initial inhibitory concentration, complete inhibitory concentration, postagent effect for bacteriostatic susceptibility, minimum bactericidal concentration, maximum tolerant concentration, and log killing time for bactericidal activity. At a concentration of 9.45 microM and an inoculum size of 10(4-5) CFU ml<sup>-1</sup>, **silver** caused growth delay of E. coli; at a concentration of 18.90 microM, **silver** completely inhibited bacterial growth. Prolonged postagent effects ranged between 1.5 and 12 h at 0.75 x the initial inhibitory concentration, 1.0 x the initial inhibitory concentration, and 1.5 x the initial inhibitory concentration of the **silver** ion. One log-unit of viable bacterial population size was lost every 30 min at the minimum bactericidal concentration of the **silver** ion. **Silver** tolerance was determined as 20 times the initial inhibitory concentration with 48 h of exposure. This study presents an evaluative model as a reference for the quantitative analysis of the susceptibility of bacteria to **silver ions**.

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### Citation 2

**Unique Identifier**

98012563

**Authors**

[Liau SY.](#) [Read DC.](#) [Pugh WJ.](#) [Furr JR.](#) [Russell AD.](#)

**Institution**

Welsh School of Pharmacy, University of Wales Cardiff, UK.

**Title**

Interaction of **silver** nitrate with readily identifiable

groups: relationship to the antibacterial action of  
**silver ions.**

**Source**

Letters in Applied Microbiology. 25(4):279-83, 1997 Oct.

**Abstract**

Microbiologically it was demonstrated that amino acids, e.g. cysteine (CySH), and other compounds, e.g. sodium thioglycollate, containing thiol groups neutralized the activity of **silver** nitrate against *Pseudomonas aeruginosa* PAO1. Amino acids with disulphide bonds were inactive, with the exception of L-cystine dimethyl ester, as were all amino acids with no sulphur groups. Iodoacetamide reacted with CySH to produce a CyS-acetamide complex that was unable to quench the activity of Ag<sup>+</sup>. Chemical analyses using cyclic voltammetry demonstrated that high coordination numbers (3.1) were obtained with thiol-containing amino acids and low numbers (0.28-0.4) with other amino acids. Both microbiologically and chemically, the results imply that interaction of Ag<sup>+</sup> with thiol groups plays an essential role in bacterial inactivation.

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**Citation 3****Unique Identifier**

97257661

**Authors**

[Williams C.](#)

**Institution**

Maelor Hospital, Wrexham, North Wales.

**Title**

Arglaes controlled release dressing in the control of bacteria.

**Source**

British Journal of Nursing. 6(2):114-5, 1997 Jan 23-Feb 12.

**Abstract**

It has been known for many years that **silver** has antimicrobial properties. Arglaes is a film dressing that provides a continuous and controlled release of **silver ions** and is produced by Maersk Medical. The name is derived from argentum, which is Latin for **silver**, and Ag, the chemical symbol for **silver**. Since the emergence of resistant organisms, topical antibiotics are best avoided. Arglaes has been developed in the light of this and appears to control the bacteria in wounds and prevent bacterial contamination. Arglaes also provides a moist environment for the healing process and is suitable for many wound types.

---

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**Citation 4****Unique Identifier**

96301495

**Authors**

[Scalzo M.](#) [Perazzi ME.](#) [Simonetti N.](#) [Cerreto F.](#)

**Institution**

Dipartimento di Studi di Chimica e Tecnologia delle Sostanze Biologicamente Attive  
Università La Sapienza, Roma, Italy.

**Title**

Antimicrobial activity of electrochemical **silver ions** in nonionic surfactant solutions and in model dispersions.

**Source**

Journal of Pharmacy & Pharmacology. 48(1):60-3, 1996 Jan.

**Abstract**

The microbicidal effectiveness against Gram-positive and Gram-negative bacteria and *Candida albicans* of electrochemical **silver ions** in aqueous solutions containing nonionic surfactants was investigated. From the perspective of the possible use of anodic **silver** as a preservative in cosmetic or pharmaceutical preparations, microbicidal efficacy was also studied in oil/water model dispersions. Surfactants and botanical extracts partially inhibited the microbicidal effectiveness of anodic **silver**. Nevertheless in all the experimental conditions, **silver ions** reduced the microbial concentration up to 4 log units of the starting inoculum in less than 6 h. The wide microbicidal spectrum and the high rate of kill of **silver ions** appear, therefore, attractive enough to suggest a possible utilization of anodic **silver** as a preserving agent.

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**Citation 5****Unique Identifier**

97156449

**Authors**

[Yamamoto K.](#) [Ohashi S.](#) [Aono M.](#) [Kokubo T.](#) [Yamada I.](#) [Yamauchi J.](#)

**Institution**

Department of Operative Dentistry, Asahi University School of Dentistry,  
Gifu, Japan.

**Title**

Antibacterial activity of **silver ions** implanted in SiO<sub>2</sub> filler on oral streptococci.

**Source**

Dental Materials. 12(4):227-9, 1996 Jul.

**Abstract**

**OBJECTIVE:** To evaluate the role of **silver ions** in composite resin dental materials, an in vivo investigation was conducted into the antibacterial effect of SiO<sub>2</sub> filler implanted with **silver ions** on oral streptococci. **METHODS.** SiO<sub>2</sub> filler samples (0.1g) were implanted with **silver ions**. The effect of the filler with **silver ions** (Ag<sup>+</sup> filler) was tested on oral streptococci bacteria. These bacterial strains had been isolated predominantly from composite resin surfaces. The organisms tested were anaerobically cultured in 5 mL Trypticase Soy Broth containing 0.5 per cent yeast extract at 37 degrees C for 10-12 h. Each bacterial strain was adjusted to a concentration of 1 x 10<sup>6</sup> cells per mL with reduced transport fluid (RTF). Ag<sup>+</sup> filler was immersed in 1 mL of RTF and anaerobically incubated 2, 6 and 12 h to study the antibacterial effect. The survival of bacteria was then estimated by culturing on TSBY agar plates. A plate with approximately 100 discrete colonies was chosen from the serial agar cultures, and the number of colonies was counted at each sampling time. **RESULTS:** The Ag<sup>+</sup> filler showed significantly more antibacterial activity than the control

filler without **silver ions**. **SIGNIFICANCE:** These results indicate that the antibacterial effect found in this study was due to the **silver ions** released by the Ag+ filler and that it may be useful to add this filler to composite resin dental materials for secondary caries protection.

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### Citation 6

**Unique Identifier**

96406079

**Authors**Nand S. Sengar GK. Nand S. Jain VK. Gupta TD.**Institution**

GSVM Medical College, Kanpur.

**Title**Dual use of **silver** for management of chronic bone infections and infected non-unions.**Source**

Journal of the Indian Medical Association. 94(3):91-5, 1996 Mar.

**Abstract**

Broad spectrum antibacterial effect of electrically generated **silver ions** has been fully established. Present work consists of clinical evaluation of beneficial antibacterial effect of **silver ions** liberated electrically with the help of locally manufactured power pack in 920 proved cases of chronic osteomyelitis with or without pathological fractures and septic non-unions. Wound debridement, **silver** iontophoresis, proper immobilisation and subsequent wound care yielded not only control of bone infections in 85% cases, but also produced healing of pathological fractures in 83% patients. Results remained unaffected by age or sex of patient, type of bone involved, duration of previous illness or type of previous treatment. Follow-up varied from 6 months to 10 years. This technique is likely to open a new chapter in treatment of chronic resistant bone infections and septic non-unions due to open fractures particularly in developing countries of the world.

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### Citation 7

**Unique Identifier**

96187578

**Authors**Jansen B. Kohnen W.**Institution**

Institute of Medical Microbiology and Hygiene, University of Cologne, Germany.

**Title**

Prevention of biofilm formation by polymer modification.

**Source**

Journal of Industrial Microbiology. 15(4):391-6, 1995 Oct.

**Abstract**



Bacterial biofilm formation on synthetic polymers plays an important role in industry and in modern medicine, leading, for example, to difficult-to-treat infections caused by colonized foreign bodies. Prevention of biofilm formation is a necessary step in the successful prophylaxis of such infections. One approach is to inhibit bacterial adherence by polymer surface modification. We have investigated polymer modification by glow discharge treatment in order to study the influence of the modified surface on bacterial adherence. Surface roughness, surface charge density and contact angles of the modified polymers were determined and related to the adherence of *Staphylococcus epidermidis* KH6. Although no influence of surface roughness and charge density on bacterial adherence was noticed, a correlation between the free enthalpy of adhesion (estimated from contact angle measurements) and adherence was observed. There seems to exist a certain minimum bacterial adherence, independent of the nature of the polymer surface. Modified polymers with negative surface charge allow for bacterial adherence close to the adherence minimum. These polymers could be improved further by the ionic bonding of **silver ions** to the surface. Such antimicrobial polymers are able to prevent bacterial colonization, which is a prerequisite for biofilm formation. It is suggested that modification of polymers and subsequent surface coupling of antimicrobials might be an effective approach for the prevention of bacterial biofilm formation.

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### Citation 8

**Unique Identifier**

96187576

**Authors**Rogers J. Dowsett AB. Keevil CW.**Institution**Research Division, Centre for Applied Microbiology and Research, Porton Down,  
Salisbury, Wiltshire, UK.**Title**A paint incorporating **silver** to control mixed biofilms  
containing *Legionella pneumophila*.**Source**

Journal of Industrial Microbiology. 15(4):377-83, 1995 Oct.

**Abstract**

A three-stage chemostat containing a mixed consortium of microorganisms, including *Legionella pneumophila*, was used to determine the suitability of a **silver**-containing paint to control biofouling in water systems. The paint was efficient in controlling total surface colonisation by heterotrophic microorganisms and growth of the pathogen over a 2-week period. Biodiversity was limited in the presence of the **silver** paint and this was thought to help control *L. pneumophila* numbers. Glass control tiles suspended alongside the **silver** painted tiles also had reduced colonisation for the 2-week period, suggesting that low levels of **silver** leached from the paint surface. This loss of **silver** was confirmed since the inhibition of biofouling and inclusion of the pathogen was not maintained after the 2-week period. Although this paint was unsuitable for controlling biofouling over extended time periods, the data suggest that a reformulated paint or electrochemical method of introducing **silver ions** may be successful.





# **EXHIBIT 9**

antiseptic / anti-infective AND  
CVC

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Citations available: 12

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## Citation 1

## Unique Identifier

99066107

## Authors

Madeo M. Martin CR. Turner C. Kirkby V. Thompson DR.

## Institution

Hull Royal Infirmary, UK.

## Title

A randomized trial comparing Arglaes (a transparent dressing containing silver ions) to Tegaderm (a transparent polyurethane dressing) for dressing peripheral arterial **catheters** and **central** vascular **catheters**.

## Source

Intensive &amp; Critical Care Nursing. 14(4):187-91, 1998 Aug.

## Abstract

The purpose of this trial was to prepare for a large randomized trial comparing Arglaes film dressing, a recent innovation containing silver ions, against Tegaderm, a transparent polyurethane dressing. Thirty-one patients admitted to the intensive care unit and requiring the insertion of an arterial line or **central venous catheter** were recruited into the study. Skin swabs were taken from the insertion sites prior to **catheterization** and on removal of the intravascular device to measure skin colonization rate between the two dressings. The **catheter** tips were also cultured on removal to establish if there was a difference between the two groups. No statistical differences were found in bacterial growth between the two dressings.

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## Citation 2

## Unique Identifier

98420289

## Authors

Bach A.

## Title

A randomized trial of an antibiotic- and **antiseptic**-coated **central venous catheter** in the prevention of **catheter**-related infections [letter].

## Source

Archives of Surgery. 133(9):1022, 1998 Sep.

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### Citation 3

**Unique Identifier**

98284684

**Authors**Terazawa E. Nagase K. Masue T. Niwa Y. Fukao I. Shimonaka H. Yokoi T. Kondoh N. Dohi S.**Institution**

Department of Anesthesiology, Gifu Prefectural Hospital.

**Title**

[Anaphylactic shock associated with a **central venous catheter** impregnated with chlorhexidine and silver sulfadiazine]. [Japanese]

**Source**

Masui - Japanese Journal of Anesthesiology. 47(5):556-61, 1998 May.

**Abstract**

A 28 year-old male patient developed anaphylactic shock on separate occasions, possibly due to the contact with a **central venous catheter** impregnated with chlorhexidine and silver sulfadiazine. He was successfully resuscitated. On the second operation, blood basophils disappeared and plasma histamine level increased extremely up to 80 ng.ml<sup>-1</sup> soon after anaphylactic shock. One year after the first shock, he did not develop anaphylactic shock following the insertion of a **central venous catheter** without the impregnation. Pin prick test and scratch test showed positive reactions only to chlorhexidine. Latex-specific anti-IgE antibody was not detected. Therefore, chlorhexidine was confirmed as the causative agent of anaphylactic shock. Because chlorhexidine is extensively used as an **antiseptic** drug in emergency rooms and intensive care units, we should be aware of the possibility of chlorhexidine induced anaphylactic reactions.

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### Citation 4

**Unique Identifier**

98193442

**Authors**Gatter N. Kohnen W. Jansen B.**Institution**

Institut für Medizinische Mikrobiologie und Hygiene, Universität zu Köln, Germany.

**Title**

In vitro efficacy of a hydrophilic **central venous catheter** loaded with silver to prevent microbial colonization.

**Source**

Zentralblatt für Bakteriologie. 287(1-2):157-69, 1998 Jan.

**Abstract**

A method was developed to load the surface of a **central venous catheter** with silver to prevent bacterial colonization. Silver confers a broad antimicrobial activity with a relatively low risk of

resistance. **Catheters** were incubated with a silver nitrate solution in different concentrations. The solvent, incubation temperature and incubation period were varied to examine the influence on the **catheter** loading. With increasing incubation temperature, time and concentration of silver nitrate, higher rates of silver elution were observed by atomic absorption spectroscopy. Furthermore, by using ethanol-water as a solvent instead of pure water, the amount of silver bound to the **catheter** surface was enhanced. The release of silver from the **catheter** surface is mainly controlled by first order kinetics. Antimicrobial efficacy of the modified **catheter**, in comparison to unloaded **catheters**, was tested in a stationary and a dynamic model with different microorganisms. Adherence experiments with *Candida albicans* showed almost complete inhibition of growth during a period of 72 hours, including initial adherence. While initial adherence of bacteria could not be prevented, these experiments showed an excellent reduction of bacterial colonization. In a perfusion model, adhesion of *E. coli* could be reduced for at least seven days. Further studies are planned to examine prolonged antimicrobial effects.

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### Citation 5

**Unique Identifier**

98065800

**Authors**Tennenberg S. Lieser M. McCurdy B. Boomer G. Howington E. Newman C. Wolf I.**Institution**Department of Surgery, Detroit Veterans Affairs Medical Center, Wayne State  
University School of Medicine, Mich 48201-1932, USA.**Title**A prospective randomized trial of an antibiotic- and  
**antiseptic-coated central**  
**venous catheter** in the prevention of  
**catheter-related infections.****Source**

Archives of Surgery. 132(12):1348-51, 1997 Dec.

**Abstract**

**OBJECTIVE:** To test the efficacy of the ARROWgard (Arrow International Inc, Reading, Pa) **central venous catheter** (CVC) coated with silver sulfadiazine and chlorhexidine (A-CVC) in the prevention of CVC-related infections. **DESIGN:** Prospective, randomized trial. **SETTING:** A tertiary care medical center. **PATIENTS AND INTERVENTION:** Two hundred eighty-two patients who required CVC placement were evaluated in this study. Patients were prospectively randomized to receive either a standard CVC (S-CVC) or the A-CVC. Only fresh-stick double- and triple-lumen **catheters** were studied. **MAIN OUTCOME MEASURES:** Patients were evaluated for **catheter** site inflammation, **catheter** site colonization, **local catheter-related infection**, and **catheter-related septicemia**. **RESULTS:** The 2 groups were matched for age, percentage in the intensive care unit, percentage receiving total parenteral nutrition, percentage with triple-lumen **catheters**, and duration of **catheterization**. Rates of **catheter** site inflammation in the 2 groups were similar (12% vs 10%, S-CVC group and A-CVC group, respectively). The A-CVC was associated with a significantly decreased **catheter** site colonization rate (49% vs 28%; 43% reduction;  $P<.001$ ) and **local catheter-related infection** rate (22.4% vs 5.8%; 74% reduction;  $P<.001$ ). Rates of **catheter-related septicemia** were reduced by 41% in the A-CVC group (6.4% vs 3.8%, S-CVC

group and A-CVC group, respectively), but this was not statistically significant. **CONCLUSIONS:** Despite a marked decrease in **catheter** site colonization and **catheter**-related infection rates, the A-CVC did not significantly reduce the incidence of **catheter**-related septicemia. This may be due to a greater pathogenic dependence on **catheter** hub contamination rather than **catheter** site colonization or **local catheter**-related infection, or the relatively short (5.2 days) duration of **catheterization** in this study.

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### Citation 6

**Unique Identifier**

98030838

**Authors**[Logghe C.](#) [Van Ossel C.](#) [D'Hoore W.](#) [Ezzedine H.](#) [Wauters G.](#) [Haxhe JJ.](#)**Institution**

Cliniques Universitaires Saint-Luc, Brussels, Belgium.

**Title**

Evaluation of chlorhexidine and silver-sulfadiazine impregnated **central venous catheters** for the prevention of bloodstream infection in leukaemic patients: a randomized controlled trial [see comments].

**Comments**

Comment in: J Hosp Infect 1998 Apr;38(4):322-4

**Source**

Journal of Hospital Infection. 37(2):145-56, 1997 Oct.

**Abstract**

It has been suggested that **central venous catheters** impregnated with **antiseptics** such as chlorhexidine and silver-sulfadiazine reduce the risk of **catheter**-related bacteraemia in intensive care patients. Patients suffering from haematologic malignancy treated by chemotherapy through a **central venous catheter** are at even greater risk of **catheter**-related bacteraemia. A prospective double-blind randomized controlled trial was performed in order to investigate the effectiveness of chlorhexidine and silver-sulfadiazine impregnated **catheters** (CH-SS) in these patients. A total of 680 **catheters** (13,826 **catheter** days) were inserted, of which 338 were **antiseptic** impregnated. Bloodstream infection was observed in 105 cases with an overall risk of 7.6 per 1000 **catheter** days. Thirty-two infections (30.5%) were **catheter**-related, corresponding to a risk of 2.3 per 1000 **catheter** days. There was no statistically significant difference between the overall rates of bloodstream infection for impregnated and non-impregnated **catheters** (14.5 vs. 16.3%). The incidence of **catheter**-related infection was also similar in both groups (5 vs. 4.4%) and there was no difference in the time of the onset of bacteraemia in the two groups. It is concluded that the use of CH-SS **catheters** in patients with haematologic malignancy reduces neither the overall risk of bloodstream infection, nor the **catheter**-related infection rate, nor the delay for the occurrence of infection.

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### Citation 7

**Unique Identifier**

97395378

**Authors**Maki DG. Stolz SM. Wheeler S. Mermel LA.**Institution**

University of Wisconsin Hospital and Clinics-H4/574, Madison 53792, USA.

**Title**

Prevention of **central venous catheter**-related bloodstream infection by use of an **antiseptic-impregnated catheter**. A randomized, controlled trial [see comments].

**Comments**

Comment in: Ann Intern Med 1997 Aug 15;127(4):304-6, Comment in: ACP J Club 1998 Mar-Apr;128(2):40-1

**Source**

Annals of Internal Medicine. 127(4):257-66, 1997 Aug 15.

**Abstract**

**BACKGROUND:** Bloodstream infection related to short-term use of noncuffed **central venous catheters** is a common and serious problem. Technologic innovations to reduce the risk for these infections are needed. **OBJECTIVE:** To determine 1) the efficacy of a novel **antiseptic catheter** in preventing **central venous catheter**-related infection, 2) patient tolerance of this **catheter**, and 3) the sources of bloodstream infection originating from noncuffed, multilumen **central venous catheters**. **DESIGN:** Randomized, controlled clinical trial. **SETTING:** Medical-surgical intensive care unit of a 450-bed university hospital. **PARTICIPANTS:** 158 adults scheduled to receive a **central venous catheter**; 403 **catheters** were studied. **INTERVENTION:** Participants received either a standard triple-lumen polyurethane **catheter** or a **catheter** that was indistinguishable from the standard **catheter** and was impregnated with chlorhexidine and silver sulfadiazine. **MEASUREMENTS:** **Catheters** were studied for colonization and **catheter**-related bloodstream infection at removal; **local** and systemic effects of **catheters** were assessed. The origin of each **catheter**-associated bloodstream infection was sought by culturing all potential sources (skin, **catheter** segments, hubs, and infusate) and confirmed by restriction-fragment DNA subtyping. **RESULTS:** **Antiseptic catheters** were less likely to be colonized at removal than control **catheters** (13.5 compared with 24.1 colonized **catheters** per 100 **catheters**; relative risk, 0.56 [95% CI, 0.36 to 0.89];  $P = 0.005$ ) and were nearly fivefold less likely to produce bloodstream infection (1.0 compared with 4.7 infections per 100 **catheters**; 1.6 compared with 7.6 infections per 1000 **catheter**-days; relative risk, 0.21 [CI, 0.03 to 0.95];  $P = 0.03$ ). In the control group, 8 **catheter**-related bloodstream infections were caused by *Staphylococcus aureus*, gram-negative bacilli, enterococci, or *Candida* species; no infections with these organisms occurred in the **antiseptic catheter** group ( $P = 0.003$ ). No adverse effects from the **antiseptic catheter** were seen, and none of the 122 isolates obtained from infected **catheters** in either group showed in vitro resistance to chlorhexidine-silver sulfadiazine. Cost-benefit analysis indicated that the **antiseptic catheter** should prove cost-beneficial if an institution's rate of **catheter**-related bacteremia with noncuffed **central venous catheters** is at least 3 infections per 1000 **catheter**-days). **CONCLUSIONS:** The chlorhexidine-silver sulfadiazine **catheter** is well tolerated, reduces the incidence of **catheter**-related infection, extends the time that noncuffed **central venous catheters** can be safely left in place for the short term, and should allow cost savings.



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### Citation 8

**Unique Identifier**

97381717

**Authors**

[Dickenson L.](#)

**Institution**

Renal Treatment Centers, Denver, CO, USA.

**Title**

**Central venous catheter**

site care: chlorhexidine vs. povidone-iodine.

**Source**

Anna Journal. 24(3):349, 358, 1997 Jun.

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### Citation 9

**Unique Identifier**

97013539

**Authors**

[Ellis ME.](#) [Rhydderch D.](#) [Zwaan F.](#) [Guy ML.](#) [Baillie F.](#)

**Institution**

Department of Medicine, King Faisal Specialist Hospital and Research Centre,  
Riyadh, Kingdom of Saudi Arabia.

**Title**

High incidence of line-related infection and mechanical failure of an  
**antiseptic impregnated central**  
**venous catheter** in highly immunocompromised  
patients.

**Source**

Scandinavian Journal of Infectious Diseases. 28(1):91-3, 1996.

**Abstract**

Prolonged **central venous catheterisation** is associated with a substantial risk of line related infection, which may be reduced when a chlorhexidine/silver-sulfadiazine coated **catheter** (ARROWgard Blue(TM)) is used in medical or surgical ICU patients. However, no data is available from severely immunocompromised patients. We therefore performed an initial exploratory study among patients with haematological malignancy, aplastic anaemia or bone marrow transplantation. The study was terminated after the 12th **catheter** insertion. Eight of 11 assessable **catheters** developed a notable degree of mechanical dysfunction, which directly led to **catheter** removal in 2 patients. Six of the 11 **catheters** were unstable. **Catheter**-related infection occurred in 5 instances. Only 1 **catheter** functioned normally and was unassociated with infection. The ARROWgard Blue(TM) **catheter** cannot be recommended for prolonged use in these patients.

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## Citation 10

## Unique Identifier

97074604

## Authors

Mimoz O. Pieroni L. Lawrence C. Edouard A. Costa Y. Samii K. Brun-Buisson C.

## Institution

Service d'Anesthesie-Reanimation, Universite de Paris Sud, Hopital Bicetre,  
Le Kremlin Bicetre, France.

## Title

Prospective, randomized trial of two **antiseptic** solutions  
for prevention of **central venous** or  
arterial **catheter** colonization and infection in intensive  
care unit patients.

## Source

Critical Care Medicine. 24(11):1818-23, 1996 Nov.

## Abstract

**OBJECTIVES:** To compare the efficacy of a newly available **antiseptic** solution (composed of 0.25% chlorhexidine gluconate, 0.025% benzalkonium chloride, and 4% benzyl alcohol), with 10% povidone iodine, on the prevention of **central venous** or arterial **catheter** colonization and infection.**DESIGN:** Prospective, randomized clinical trial. **SETTING:** Surgical-trauma intensive care unit (ICU) in a university hospital. **PATIENTS:** All patients admitted to the ICU and requiring the insertion of a **central venous** and/or an arterial **catheter** from July 1, 1992 to October 31, 1993.**INTERVENTIONS:** Patients were randomly assigned to one of two groups according to the **antiseptic** solution used for insertion and **catheter** care. The same solution was used for skin disinfection from the time of **catheter** insertion to the time of removal of each **catheter**.**MEASUREMENTS AND MAIN RESULTS:** **Catheter** distal tips were quantitatively cultured when **catheters** were no longer necessary, if there was a suspicion of **catheter**-related infection, and routinely after 7 days of use for arterial **catheters**, or after 15 days of use for **central venous catheters**. The rate of significant **catheter** colonization (i.e.,  $\geq 10^3$  colony-forming units [cfu]/mL by quantitative culture), and **catheter**-related sepsis (as defined by sepsis abating following **catheter** removal per 1,000 **catheter**-days), were significantly lower in the chlorhexidine group (12 vs. 31 [relative risk 0.4, 95% confidence interval 0.1 to 0.9,  $p < .01$ ] and 6 vs. 16 [relative risk 0.4, 95% confidence interval 0.1 to 1,  $p = 0.5$ ], respectively). The rate of **central venous catheter** colonization and **central venous catheter**-related sepsis per 1,000 **catheter**-days were also significantly lower in the chlorhexidine group (8 vs. 31 [relative risk 0.3, 95% confidence interval 0.1 to 1,  $p = .03$ ] and 5 vs. 19 [relative risk 0.3, 95% confidence interval 0.1 to 1,  $p = .02$ ], respectively). Finally, the rate of arterial **catheter** colonization per 1,000 **catheter**-days was significantly lower in the chlorhexidine group (15 vs. 32 [relative risk 0.5, 95% confidence interval 0.1 to 1,  $p = .05$ ]), whereas the rate of arterial **catheter**-related sepsis per 1,000 **catheter**-days was similar for the two study groups (8 in the chlorhexidine group vs. 10 in the povidone iodine group [relative risk 0.8, 95% confidence interval 0.1 to 2.2,  $p = .6$ ]). The 0.25% chlorhexidine solution was superior to the 10% povidone iodine solution in preventing **catheter** colonizations and **catheter**-related sepsis due to Gram-positive bacteria (5 vs. 20 [ $p < .001$ ], and 2 vs. 10 [ $p < .001$ ], respectively), whereas the activity of the 0.25% chlorhexidine solution was nonsignificantly superior in preventing Gram-negative infections (7 vs. 4 [ $p = .5$ ], and 4 vs. 2 [ $p = .8$ ], respectively).**CONCLUSIONS:** The 4% alcohol-based solution of 0.25% chlorhexidine gluconate and 0.025% benzalkonium chloride was more effective than 10% povidone iodine for insertion site care of

short-term **central venous** and arterial **catheters**. This effect appeared related to a more efficacious prevention of infections with Gram-positive bacteria.

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### Citation 11

**Unique Identifier**

96391254

**Authors**[Adal KA.](#) [Farr BM.](#)**Institution**

University of Virginia Health Sciences Center, Charlottesville 22908, USA.

**Title****Central venous catheter-related infections: a review.** [Review] [94 refs]**Source**

Nutrition. 12(3):208-13, 1996 Mar.

**Abstract**

**Catheter**-associated bloodstream infections remain an important cause of nosocomial infection, with an estimated 50,000-100,000 cases occurring each year in the United States. **Central venous catheters** are believed to be responsible for 90% of such infections. The cumulative risk of acquiring a **catheter**-related bloodstream infection has ranged between 1 and 10% for **central venous catheters** in general and 6% for total parenteral nutrition **catheters**. The skin is the most common source of organisms causing **catheter**-related infections. Recent prospective studies have shown that the incidence density per **catheter** day does not increase with duration of **catheterization** and that routine changes, either over a guidewire or by new site puncture, do not appear to lower the risk of infection. Diagnosis of infection can be difficult in intensive care patients but is usually easier in less ill patients with a **central venous catheter**. Quantitative or semiquantitative laboratory techniques can be used to confirm the diagnosis in the appropriate clinical setting. A variety of preventive measures have been shown to minimize the risk of development of **catheter**-related bloodstream infection, including use of maximal aseptic technique for insertion, use of special teams for care of the **catheter**, limiting manipulation of the **catheter**, use of povidone-iodine ointment and cotton gauze dressings for recently inserted **catheters**, a silver-impregnated collagen cuff and **antiseptic-impregnated catheters**. [References: 94]

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### Citation 12

**Unique Identifier**

96310893

**Authors**[Ciresi DL.](#) [Albrecht RM.](#) [Volkers PA.](#) [Scholten DJ.](#)**Institution**

Department of Surgery, Butterworth Hospital, Grand Rapids, Michigan, USA.

**Title**

Failure of **antiseptic** bonding to prevent  
**central venous**  
**catheter**-related infection and sepsis.

#### Source

American Surgeon. 62(8):641-6, 1996 Aug.

#### Abstract

Infection associated with the use of triple lumen **catheters** in hospitals is a frequent and serious complication. The prevailing hypothesis for the origin of **catheter**-related infection (CRI) is bacterial colonization and subsequent infection of the skin insertion site and **catheter** interface. The recently released ARROWgard **catheter** contains a bonded synergistic combination of silver sulfadiazine and chlorhexidine, which is thought to render the **catheter** resistant to bacterial colonization and subsequent sepsis. The purpose of this study is to compare the incidence of CRI and **catheter**-related sepsis (CRS) between a standard triple lumen **catheter** and ARROWgard **antiseptic** coated **catheter** in patients receiving total parenteral nutrition (TPN). A randomized, prospective clinical trial was conducted at a community referral center from January 1993 through April 1994. One-hundred-ninety-one patients with need for TPN were randomized to receive either the ARROWgard or a standard triple lumen **catheter** placed under a strict sterile protocol. CRI was defined as  $\geq 15$  colony forming units by semiquantitative culture technique of the **catheter** tip or intracutaneous segment. CRS was defined as growth of the same organism on the **catheter** and at least one peripheral blood culture. All **catheters** were cultured. Ninety-two patients received the ARROWgard **catheter**, and 99 patients received the standard **catheter**. There were no differences between the average age, sex, length of hospital stay, days on TPN, number of **catheters**/patient, indications for TPN, primary diagnoses, or duration of the **central** line between the two groups. The overall rate of CRI was 11.5 per cent, and CRS was 8.4 per cent in this study. The rate of CRI for the ARROWgard was 10.9 per cent, compared with 12.9 per cent for the standard **catheter** ( $P = \text{NS}$ ). The rate of CRS for the ARROWgard was 8.7 per cent, compared with 8.1 per cent for the standard **catheter** ( $P = \text{NS}$ ). The coating of **central venous catheters** with silver sulfadiazine and chlorhexidine does not reduce the rate CRI or CRS when compared with standard **central venous catheters** in patients receiving TPN.



antiseptics

2 references to  
anaphylactic  
shock due to  
Chlorhexidine G.

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Citations available: 11

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### Citation 1

#### Unique Identifier

99011769

#### Authors

Jeng DK. Severin JE.

#### Institution

Allegiance Healthcare Corporation, McGaw Park, IL 60085, USA.

#### Title

Povidone iodine gel alcohol: a 30-second, onetime application preoperative skin preparation.

#### Source

American Journal of Infection Control. 26(5):488-94, 1998 Oct.

#### Abstract

**BACKGROUND:** Simplifying and shortening the skin-preparation application procedure is desirable for many reasons, which include labor-cost savings and improved suite utilization. A new formulation, PVP-I Gel Alcohol (PGA) that contains 5% PVP-I and 62% ethanol in gel form, was developed to achieve a shorter preparation time with a rapid and persistent efficacy on a broad spectrum of microorganisms and to minimize the potential for iodine irritation. **METHOD:** The test methods outlined in the Federal Register, 21 CFR Parts 333 and 369, "Tentative Final Monograph for Health-Care Antiseptic Drug Products;" Proposed Rule, 1994 (Monograph), were adapted in this study. Efficacy of PGA was evaluated, both in vitro and in vivo. The in vitro time-kill and minimum inhibition concentration tests were conducted by using 33 strains of aerobic and anaerobic gram-positive bacteria, gram-negative bacteria, yeasts, and antibiotic-resistant bacteria. In the clinical test, the inguinal and abdominal skin sites of human subjects were exposed to PGA for 30 seconds to assess the antimicrobial efficacy on normal skin flora. Betadine PVP-I scrub was tested in a 5-minute application as a control. **RESULTS:** The time-kill test showed that PGA delivered a rapid antimicrobial activity--reducing greater than 3 to 8 log microorganisms in 15 seconds in all of the 33 species of microorganisms tested. Within 30 seconds, all challenge organisms were reduced below detection level. Results of the minimum inhibition concentration test showed that PGA demonstrated an equivalent activity to Betadine control under the testing conditions. In the clinical test, PGA was effective in the reduction of greater than 3 log and 2 log of normal skin flora, respectively, in inguinal and abdominal sites in a single-step 30-second application. Bacteria levels remained significantly below the baseline for 6 hours in the primary study and for 24 hours in a secondary study. These results show that the current PGA formulation with a 30-second application delivers an efficacy equivalent to Betadine scrub in a 5-minute application and that the PGA formulation has a long-lasting effect--up to 24 hours. **CONCLUSION:** The PGA formulation delivered rapid and persistent antimicrobial activity against a broad spectrum of bacteria both in vitro and in vivo. PGA is an effective skin-preparation formulation for use in a single-step 30-second application.

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### Citation 2

**Unique Identifier**

99056113

**Authors**[Dallimore KJ.](#)**Title**

Effect of an ointment containing boric acid, zinc oxide, starch and petrolatum on psoriasis (letter).

**Source**

Australasian Journal of Dermatology. 39(4):283, 1998 Nov.

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### Citation 3

**Unique Identifier**

99047978

**Authors**[Chaudhary U.](#) [Nagpal RC.](#) [Malik AK.](#) [Kumar A.](#)**Title**

Comparative evaluation of antimicrobial activity of polyvinylpyrrolidone (PVP)-iodine versus topical antibiotics in cataract surgery.

**Source**

Journal of the Indian Medical Association. 96(7):202-4, 1998 Jul.

**Abstract**

Comparative evaluation of polyvinylpyrrolidone (PVP)-iodine versus topical broad-spectrum antibiotics for disinfecting the eye and surrounding area to prevent postoperative complications was carried out on 100 patients. PVP-iodine proved superior **antiseptic** for pre-operative preparation of eyes before cataract surgery. It was cheaper, caused minimal side-effects, reduced bacterial counts to a great extent and eliminated fungi completely.

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### Citation 4

**Unique Identifier**

98434294

**Authors**[Hase JC.](#) [Attstrom R.](#) [Edwardsson S.](#) [Kelty E.](#) [Kisch J.](#)**Institution**

Department of Clinical Research, Biosurface AB, Malmo, Sweden.

**Title**

6-month use of 0.2% delmopinol hydrochloride in comparison with 0.2% chlorhexidine digluconate and placebo. (I). Effect on plaque formation and gingivitis.

**Source**

Journal of Clinical Periodontology. 25(9):746-53, 1998 Sep.

**Abstract**

A double-blind, randomised, 6-month clinical trial with parallel group design in 149 patients with gingivitis was conducted to study the efficacy and safety of delmopinol hydrochloride 2 mg/ml (0.2% w/v, Decapinol Mouthwash) used for partly supervised mouthrinsing in comparison with chlorhexidine digluconate 2 mg/ml (0.2% w/v, Hibitane Dental, ICI Pharmaceuticals, UK) and placebo as an addition to normal oral hygiene. Assessments of efficacy were performed using the plaque index and bleeding on probing (BOP). Delmopinol showed 22% lower plaque index scores than placebo after 3 months ( $p < 0.01$ ) and 13% lower scores after 6 months. The corresponding figures for chlorhexidine were 38% ( $p < 0.001$ ) and 38% ( $p < 0.001$ ) after 3 and 6 months, respectively. Bleeding on probing was reduced for delmopinol in comparison with placebo by 11% after 3 months and by 18% ( $p < 0.05$ ) after 6 months. For chlorhexidine the corresponding figures were 18% ( $p < 0.01$ ) and 22% ( $p < 0.01$ ) after 3 and 6 months, respectively. While chlorhexidine showed greater plaque reduction than delmopinol ( $p < 0.01$  at 6 months), no statistically significant difference was reached between these two solutions regarding BOP. Both active solutions showed an increased amount of dental calculus in comparison with placebo. A transient anaesthetic sensation in the oral mucosa and taste affection were commonly reported adverse events in both the delmopinol and the chlorhexidine groups. The number of patients withdrawn from treatment due to adverse events or lack of cooperation was 7 in the chlorhexidine group, 4 in the placebo group and 1 in the delmopinol group. The results showed that rinsing with either 0.2% delmopinol hydrochloride or 0.2% chlorhexidine digluconate twice daily for 60 secs for 6 months results in less plaque formation and gingivitis than rinsing with placebo. Mouthrinsing with the 0.2% delmopinol hydrochloride solution was well accepted in this study.

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**Citation 5****Unique Identifier**

98434289

**Authors**

Mayfield L. Soderholm G. Norderyd O. Attstrom R.

**Institution**

Lund University, Faculty of Odontology, Malmo, Sweden.

**Title**

Root conditioning using EDTA gel as an adjunct to surgical therapy for the treatment of intraosseous periodontal defects.

**Source**

Journal of Clinical Periodontology. 25(9):707-14, 1998 Sep.

**Abstract**

The aim of this clinical study was to compare the treatment outcome following root surface conditioning using an EDTA gel preparation in conjunction with surgical therapy with that following conventional flap surgery in periodontal intraosseous defects. 36 patients, each of them contributing one intraosseous defect  $> \text{or} = 4$  mm in depth participated. Defect sites had a probing pocket depth  $>$

or =5 mm and bled on probing following hygienic treatment phase. No furcation involvement or endodontic complications were present. In the EDTA group, 18 consecutive patients, defects were treated by root conditioning with EDTA gel for 3 minutes in combination with surgical therapy. In the control group, 18 patients, conventional flap surgery was performed without root conditioning. Chlorhexidine rinsings 0.2% were prescribed following surgery for 2-3 weeks with modified oral hygiene instruction. A strict recall program was implemented including professional prophylaxis and oral hygiene reinforcement every 4-6 weeks until 6-month re-evaluation. Baseline probing pocket depths and defect depths of 7.1 $\pm$ 1.3 mm and 6.9 $\pm$ 1.6 mm in the EDTA group and 7.6 $\pm$ 1.9 mm and 6.6 $\pm$ 1.7 mm, respectively, in the control group were measured. 6-month clinical results showed a significant probing attachment level gain of 1.8 $\pm$ 1.5 mm and 1.0 $\pm$ 1.7 mm in the EDTA and control groups respectively. A probing bone gain of 1.0 $\pm$ 1.3 mm in the EDTA group was measured with a non-significant gain of 0.4 $\pm$ 1.2 mm in the control group. Radiographic analysis confirmed these results. There were no statistically significant differences in treatment outcome between the group treated by root conditioning in combination with flap surgery and conventional flap surgery alone.

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### Citation 6

**Unique Identifier**

99011078

**Authors**[Yates R.](#) [West N.](#) [Addy M.](#) [Marlow I.](#)**Institution**

Division of Restorative Dentistry, Dental School, Bristol, UK.

**Title**

The effects of a potassium citrate, cetylpyridinium chloride, sodium fluoride mouthrinse on dentine hypersensitivity, plaque and gingivitis. A placebo-controlled study.

**Source**

Journal of Clinical Periodontology. 25(10):813-20, 1998 Oct.

**Abstract**

Home-use studies on dentine hypersensitivity have most commonly involved toothpastes and rarely have mouthrinses been employed. Potassium and/or fluoride toothpastes have been shown effective in the treatment of dentine hypersensitivity. The aim of this study was to evaluate the effectiveness of a total formulation, containing potassium citrate, sodium fluoride, cetylpyridinium chloride mouthrinse compared to the base rinse minus actives in the reduction of dentine hypersensitivity. The study was a randomised placebo controlled, double blind parallel design. At a screening visit, 90 adult subjects were recruited who were suffering from dentine hypersensitivity from at least 1 tooth responding to tactile stimulation (45gm pressure) and had at least 2 teeth responding to evaporative stimulation (air blast). During a washout period of 28 days and throughout the 56-day study period, subjects used a soft filament toothbrush and standard fluoride toothpaste. At baseline (day 1), threshold sensitivities to incremental tactile (10 g to 70 g) and evaporative stimuli were determined. Gingival health was assessed by recording bleeding on probing at 25 g pressure at mesiobuccal and lingual sites. Plaque scores from buccal and lingual surfaces of disclosed teeth were also measured. Subjects then used the prescribed rinse, 10 ml for at least 30 s after brushing 2x per day returning on days 28 and 56 for rescoring of sensitivity, gingivitis and plaque. Data from 88 subjects were used with the intent to treat analyses and 83 in the completely evaluable analyses. Groups were well



balanced for demographic data and product returns suggested good compliance. Both groups showed highly significant improvements in tooth sensitivity. The pattern was for greater improvement in the test compared to the control group (statistically significant for the plaque score), whereas bleeding scores, already low, showed no change in either group. By definition, the placebo rinse could not have exerted any therapeutic action; the study therefore provides clear direct evidence as to the magnitude (30%-40%) of the little studied, but assumed, placebo response in dentine hypersensitivity trials.

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### Citation 7

**Unique Identifier**

99046218

**Authors**Rahman MR. Johnson GJ. Husain R. Howlader SA. Minassian DC.**Institution**

Department of Preventive Ophthalmology, University College London.

**Title**

Randomised trial of 0.2% chlorhexidine gluconate and 2.5% natamycin for fungal keratitis in Bangladesh.

**Source**

British Journal of Ophthalmology. 82(8):919-25, 1998 Aug.

**Abstract**

AIM: The management of suppurative keratitis due to filamentous fungi presents severe problems in tropical countries. The aim was to demonstrate the efficacy of chlorhexidine 0.2% drops as an inexpensive antimicrobial agent, which could be widely distributed for fungal keratitis. **METHODS:** Successive patients presenting to the Chittagong Eye Institute and Training Complex with corneal ulcers were admitted to the trial when fungal hyphae had been seen on microscopy. They were randomised to drop treatment with chlorhexidine gluconate 0.2% or the standard local treatment natamycin 2.5%. The diameters, depths, and other features of the ulcers were measured and photographed at regular intervals. The outcome measures were healing at 21 days and presence or absence of toxicity. If there was not a favourable response at 5 days, "treatment failure" was recorded and the treatment was changed to one or more of three options, which included econazole 1% in the latter part of the trial. **RESULTS:** 71 patients were recruited to the trial, of which 35 were randomised to chlorhexidine and 36 to natamycin. One allocated to natamycin grew bacteria and therefore was excluded from the analysis. None of the severe ulcers was fully healed at 21 days of treatment, but three of those allocated to chlorhexidine eventually healed in times up to 60 days. Of the nonsevere ulcers, 66.7% were healed at 21 days with chlorhexidine and 36.0% with natamycin, a relative efficacy (RE) of 1.85 (CL 1.01-3.39,  $p = 0.04$ ). If those ulcers were excluded where fungi were seen in the scraping but did not grow on culture, the estimated efficacy ratio does not change but becomes less precise because of smaller numbers. Equal numbers of *Aspergillus* (22) and *Fusarium* (22) were grown. The *Aspergillus* were the most resistant to either primary treatment. **CONCLUSIONS:** Chlorhexidine may have potential as an inexpensive topical agent for fungal keratitis and warrants further assessment as a first line treatment in situations where microbiological facilities and a range of antifungal agents are not available.

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### Citation 8

**Unique Identifier**

98445996

**Authors**

[Thune P.](#)

**Institution**

Romeriksklinikken, Strommen.

**Title**

[Two patients with chlorhexidine allergy--anaphylactic reactions and eczema].  
[Norwegian]

**Source**

Tidsskrift for Den Norske Laegeforening. 118(21):3295-6, 1998 Sep 10.

**Abstract**

A 14 year-old girl experienced a combined delayed and immediate type of allergy to chlorhexidine. She first developed an eczematous reaction in the face following the long-term application of an antiacne preparation. Use test (repeated Open Application Test, ROAT) on the forearm was positive. Epicutaneous tests with 1% chlorhexidine gluconate and acetate were both positive. About six months later she developed an urticarial rash and syncope after cleansing the skin with chlorhexidine gluconate. Prick tests were positive to 0.05% chlorhexidine gluconate and to 0.01% of the acetate solution. A 30 year-old man developed anaphylactic symptoms following treatment with an **antiseptic** dental gel containing 1% chlorhexidine gluconate. Prick test was positive to the gel and to chlorhexidine gluconate 0.5%.

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### Citation 9

**Unique Identifier**

98421246

**Authors**

[Rees EN.](#) [Tebbs SE.](#) [Elliott TS.](#)

**Institution**

Department of Clinical Microbiology, Queen Elizabeth Hospital, University  
Hospital Birmingham NHS Trust, Edgbaston, UK.

**Title**

Role of antimicrobial-impregnated polymer and Teflon in the prevention of  
biliary stent blockage.

**Source**

Journal of Hospital Infection. 39(4):323-9, 1998 Aug.

**Abstract**

Biliary stent blockage and microbial colonization is a common complication associated with polyurethane stents used for the relief of bile-duct obstruction caused by benign or malignant disease. In an attempt to overcome this problem the application of a 'Teflon' (polytetrafluoroethylene) stent and an antimicrobial benzalkonium chloride (BZC) impregnated polymer were investigated. The effects of these materials on microbial colonization were compared

to a polyurethane stent in vitro in broth or bile. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of BZC for three commonly isolated biliary stent pathogens, *Staphylococcus epidermidis*, *Enterococcus faecium* and *Enterobacter cloacae* were also determined. All the isolates were sensitive to BZC. The growth kinetics of the three organisms in broth and in human pooled bile were similar. Adherence to the BZC impregnated polymer was significantly reduced as compared to the polyurethane and Teflon stents ( $P < 0.05$ ) in nutrient broth. In bile, fewer organisms attached to the Teflon as compared with the polyurethane stent ( $P < 0.05$ ) for all organisms. For two of the three test organisms there was less bacterial adherence to the Teflon than to the BZC impregnated polymer. The Teflon and antimicrobial stent materials studied may prevent biliary stent blockage resulting from microbial colonization.

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### Citation 10

**Unique Identifier**

98420289

**Authors**[Bach A.](#)**Title**

A randomized trial of an antibiotic- and **antiseptic**-coated central venous catheter in the prevention of catheter-related infections [letter].

**Source**

Archives of Surgery. 133(9):1022, 1998 Sep.

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### Citation 11

**Unique Identifier**

98284684

**Authors**

[Terazawa E.](#) [Nagase K.](#) [Masue T.](#) [Niwa Y.](#) [Fukao I.](#) [Shimonaka H.](#) [Yokoi T.](#) [Kondoh N.](#) [Dohi S.](#)

**Institution**

Department of Anesthesiology, Gifu Prefectural Hospital.

**Title**

[Anaphylactic shock associated with a central venous catheter impregnated with chlorhexidine and silver sulfadiazine]. [Japanese]

**Source**

Masui - Japanese Journal of Anesthesiology. 47(5):556-61, 1998 May.

**Abstract**

A 28 year-old male patient developed anaphylactic shock on separate occasions, possibly due to the contact with a central venous catheter impregnated with chlorhexidine and silver sulfadiazine. He was successfully resuscitated. On the second operation, blood basophils disappeared and plasma histamine level increased extremely up to 80 ng.ml<sup>-1</sup> soon after anaphylactic shock. One year after the first shock, he did not develop anaphylactic shock following the insertion of a central venous

catheter without the impregnation. Pin prick test and scratch test showed positive reactions only to chlorhexidine. Latex-specific anti-IgE antibody was not detected. Therefore, chlorhexidine was confirmed as the causative agent of anaphylactic shock. Because chlorhexidine is extensively used as an **antiseptic** drug in emergency rooms and intensive care units, we should be aware of the possibility of chlorhexidine induced anaphylactic reactions.



# **EXHIBIT 10**

Benzydamine

Results of your search : from 1 [Benzydamine/ or "benzydamine hydrochloride".mp.] keep 1-13

Citations available: 13

Citations displayed: 1-13

Go to ... [Help](#) | [Logoff](#)

### Citation 1

**Unique Identifier**

99029998

**Authors**

Kawaji A. Isohe M. Tochino Y. Takabatake E. Chikaoka Y. Nomura Y. Tamura M.

**Institution**

Department of Toxicology, Faculty of Pharmaceutical Sciences, Setsunan University, Hirakata, Osaka, Japan. [kotani@pharm.setsunan.ac.jp](mailto:kotani@pharm.setsunan.ac.jp)

**Title**

Flavin-containing monooxygenase mediated metabolism of **benzydamine** in perfused brain and liver.

**Source**

Biochimica et Biophysica Acta. 1425(1):41-6, 1998 Sep 16.

**Abstract**

**Benzydamine** (BZY) N-oxidation mediated by flavin-containing monooxygenase (FMO) was evaluated in perfused brain and liver. Following 20 min of perfusion with modified Ringer solution, the infusion of BZY into brain or liver led to production of BZY N-oxide. BZY N-oxide, a metabolite of BZY oxidized exclusively by FMO, was mostly recovered in the effluent without undergoing further metabolism or reduction back to the parent substrate. The BZY N-oxide formation rate increased as the infusion concentration of BZY increased both in perfused brain and perfused liver. BZY N-oxidation activities in perfused rat brain and liver were 4.2 nmol/g brain/min and 50 nmol/g liver/min, respectively, although the BZY N-oxidation activity in brain homogenates was one 4000th that in liver homogenates. This is the first study of FMO activity in brain in situ.

---

Go to ... [Help](#) | [Logoff](#)

### Citation 2

**Unique Identifier**

98384829

**Authors**

Moore DE. Wang J.

**Institution**

School of Pharmacy, University of Sydney, Australia.  
[demoore@pharm.usyd.edu.au](mailto:demoore@pharm.usyd.edu.au)

**Title**

Electron-transfer mechanisms in photosensitization by the anti-inflammatory drug **benzydamine**.

**Source**

Journal of Photochemistry & Photobiology. B - Biology. 43(3):175-80, 1998

Jun 1.

### Abstract

The novel anti-inflammatory drug **benzydamine** has been shown to photosensitize the reduction of Nitro Blue Tetrazolium, ferricytochrome c and copper (II) bathocuproinedisulphonate in aqueous solutions (pH 7.4, 30 degrees C) when irradiated with UV light at its maximum absorption wavelength of 308 nm. The reduction reactions all proceed most efficiently when the solutions are deoxygenated, clearly indicating that direct electron transfer occurs from the excited state of the sensitizer to the substrate. In aerated solutions the reduction reactions are slower and are partially inhibited by superoxide dismutase, suggesting that superoxide anion could be involved as an intermediate when oxygen is present. **Benzydamine** also photosensitizes the oxidation of 1-histidine and 2,5-dimethylfuran by the singlet oxygen pathway in aerated solutions. The ability of **benzydamine** to participate as sensitizer in several types of photochemical reaction is relevant to the observed clinical photosensitivity of the drug.

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### Citation 3

#### Unique Identifier

97480742

#### Authors

[Guglielmotti A.](#) [Aquilini L.](#) [Rosignoli MT.](#) [Landolfi C.](#) [Soldo L.](#) [Coletta I.](#) [Pinza M.](#)

#### Institution

Laboratory of Immunopharmacology, Angelini Ricerche, Rome, Italy.

#### Title

**Benzydamine** protection in a mouse model of endotoxemia.

#### Source

Inflammation Research. 46(9):332-5, 1997 Sep.

#### Abstract

**OBJECTIVE:** Previous studies have shown that **benzydamine** (40 mg/kg s.c.) is able to inhibit tumor necrosis factor (TNF) production and to reduce mouse lethality when administered before or concomitantly with LPS. The present study was designed to further investigate **benzydamine** activity against LPS-induced toxicity in terms of potency and therapeutic effects. **METHODS:** Female Balb/c mice were used. A dose-response curve of animal lethality versus endotoxin dose was performed (LD50 = 45 micrograms/mouse). Therapeutic effects were studied selecting the dose of LPS to achieve an LD100 (160 micrograms/mouse). Mortality was assessed daily and mice were followed for 8 days. The potential mode of action of therapeutically administered **benzydamine** was also investigated. TNF alpha and IL-1 beta levels were measured, at 5 h after LPS injection, both in sera and in lungs. Moreover, the drug was assayed in a TNF-dependent cytotoxicity test. **RESULTS:** **Benzydamine**, administered at 20 mg/kg s.c. simultaneously with the endotoxin, significantly increased LPS LD50 up to 230 micrograms/mouse ( $p < 0.05$ ). Moreover, the drug significantly protected mice against LPS-induced lethality when administered either 30 min or 4 h after endotoxin injection ( $p < 0.001$ ). **Benzydamine**, therapeutically administered at 20 mg/kg s.c., significantly reduced TNF alpha and IL-1 beta production induced by LPS both in serum and lungs and it was shown to inhibit TNF-dependent cytotoxicity on L929 cells. **CONCLUSIONS:** These results clearly demonstrate the therapeutic activity of **benzydamine** in a simple model of endotoxic shock. Available data confirm the potential role of **benzydamine** as an anti-cytokine agent and provide

suggestions for novel therapeutic applications of this anti-inflammatory drug.

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#### Citation 4

**Unique Identifier**

97411304

**Authors**

[Sironi M.](#) [Milanese C.](#) [Vecchi A.](#) [Polenzani L.](#) [Guglielmotti A.](#) [Coletta I.](#) [Landolfi C.](#) [Soldo L.](#)  
[Mantovani A.](#) [Pinza M.](#)

**Institution**

Istituto Ricerche Farmacologiche M. Negri, Milan, Italy.

**Title**

**Benzydamine** inhibits the release of tumor necrosis factor-alpha and monocyte chemotactic protein-1 by *Candida albicans*-stimulated human peripheral blood cells.

**Source**

International Journal of Clinical & Laboratory Research. 27(2):118-22, 1997.

**Abstract**

**Benzydamine** is a non-steroidal antiinflammatory drug, devoid of activity on arachidonic acid metabolism, which is extensively used as a topical drug in inflammatory conditions, particularly for the treatment of bacterial vaginosis and *Candida albicans*-sustained vaginitis. In the present study the effects of **benzydamine** on the production of several inflammatory cytokines were examined in cultures of *Candida albicans*-stimulated human mononuclear cells. **Benzydamine** (6.25-50 microM) inhibited *Candida*-induced tumor necrosis factor-alpha and, to a lesser extent, interleukin-1 beta production, whereas it did not affect interleukin-6 release. **Benzydamine** also blocked monocyte chemotactic protein-1 secretion, but it did not affect interleukin-8 production. Unlike **benzydamine**, ibuprofen and naproxen, two non-steroidal antiinflammatory drugs also used topically, were unable to suppress inflammatory lymphokine production from *Candida*-activated mononuclear cells. These data suggest that **benzydamine** may be effective in local *Candida* infections at least in part by suppressing inflammatory cytokine and monokine production in the vaginal mucosa and consequently decreasing their levels in vaginal secretions.

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Go to ... [Help](#) | [Logoff](#)

#### Citation 5

**Unique Identifier**

97440599

**Authors**

[Bebawy LI.](#) [el Kelani K.](#) [Abdel Fattah L.](#) [Ahmad AK.](#)

**Institution**

National Organization For Drug Control and Research, Egypt.

**Title**

Study of 7,7',8,8'-tetracyanoquinodimethane charge transfer complexes with some lone-pair-donating drugs.



**Source**

Journal of Pharmaceutical Sciences. 86(9):1030-3, 1997 Sep.

**Abstract**

The interaction between 7,7',8,8'-tetracyanoquinodimethane (TCNQ) and oxamniquine (I), azithromycin (II), omeprazole (III), pantoprazole (IV), and **benzylamine hydrochloride** (V) was investigated. The reaction conditions were optimized to obtain typical charge transfer complexes (CTC). The nature of the formed complexes was proved by thorough study of the thermodynamic parameters namely  $\Delta G$  (free energy),  $\Delta H$  (enthalpy), and  $\Delta S$  (entropy). The association constant  $K_{cAD}$  and the molar absorptivity  $\epsilon_{\lambda AD}$  of the formed complexes were determined using the Benesi-Hildbrand equation. The effect of temperature on these constants gave evidence of CTC formation. The reaction of TCNQ with I-V was found to be in 1:1; as being determined by the Foster method. Spectrophotometric measurements of the formed CTC were used for the quantitative determination of the studied drugs in both pure or pharmaceutical formulation. The mean percentage recoveries were 99.17  $\pm$  0.34, 99.75  $\pm$  0.12, 100.52  $\pm$  0.41, 98.75  $\pm$  0.63, and 99.23  $\pm$  0.62 for I, II, III, IV, and V, respectively. There was no significant difference observed when the method was statistically compared with the official and reference methods used to determine these drugs.

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**Citation 6****Unique Identifier**

97377767

**Authors**

Chulkova OV. Demidova LV. Udovichenko VI.

**Title**

[Clinical experience with the use of Tantum Rosa in cancer patients].  
[Russian]

**Source**

Voprosy Onkologii. 43(3):339-40, 1997.

---

Go to ... [Help](#) | [Logoff](#)

**Citation 7****Unique Identifier**

97215671

**Authors**

Edres MA. Scully C. Gelbier M.

**Institution**

Eastman Dental Institute, University of London.

**Title**

Use of proprietary agents to relieve recurrent aphthous stomatitis.

**Source**

British Dental Journal. 182(4):144-6, 1997 Feb 22.

**Abstract**

AIM: To examine the subjective efficacy of proprietary agents for aphthous stomatitis. **DESIGN:** A simple open study. **SETTING:** Hospital out-patients in the UK in 1993. **SUBJECTS:** 50 consecutive patients with aphthae. **OUTCOME:** Patients assessed agent efficacy as very effective, possibly effective or not effective at relieving symptoms. **RESULTS:** 38 of 54 available agents were used. Difflam Oral Rinse (**benzydamine hydrochloride**) appeared to give most control of pain. Overall, Corsodyl mouthwash (chlorhexidine gluconate) gave most beneficial effect. **CONCLUSIONS:** Difflam and Corsodyl appear to give some symptomatic relief to aphthous victims.

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### Citation 8

#### Unique Identifier

97086953

#### Authors

Sironi M. Pozzi P. Polentarutti N. Benigni F. Coletta I. Guglielmotti A. Milanese C. Ghezzi P.  
Vecchi A. Pinza M. Mantovani A.

#### Institution

Istituto Ricerche Farmacologiche Mario Negri, Milano, Italy.

#### Title

Inhibition of inflammatory cytokine production and protection against endotoxin toxicity by **benzydamine**.

#### Source

Cytokine. 8(9):710-6, 1996 Sep.

#### Abstract

The present study was designed to assess the effect of N,N-dimethyl-3-[(1-benzyl-1H-indazol-3-yl)ossi]-1-propanamine (**benzydamine**) on in vivo and in vitro production of inflammatory cytokines. **Benzydamine** inhibited tumour necrosis factor-alpha (TNF-alpha) production in vitro by human lipopolysaccharide-stimulated monocytes with an ED50 of approximately 25 microM (12 donors). Under the same conditions, **benzydamine** had modest or no effect on production of interleukin (IL-1), IL-6 and IL-8. Inhibition of TNF-alpha production was not restricted to LPS in that similar results were obtained using inactivated streptococci. Inhibition of TNF production was associated with a modest (about 30% at 50 microM, 7 donors) reduction of mRNA. A similar inhibition of TNF-alpha production was also detected with mouse peritoneal macrophages. With mouse cells **benzydamine** also substantially inhibited IL-1 production in vitro. In vivo treatment with **benzydamine** (40 mg/kg s.c.) protected mice against LPS lethality. Protection against septic shock was observed when **benzydamine** was administered before or concomitantly with LPS. Protection against LPS toxicity was associated with a marked reduction of serum levels of TNF-alpha and IL-1 beta, whereas IL-6 was unaffected. Inhibition of inflammatory cytokine production may play a role in the anti-inflammatory activity of **benzydamine** and provide suggestions for novel therapeutic applications.

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### Citation 9

**Unique Identifier**

97043721

**Authors**Solomon C. Arendorf T. Shaikh A. Mills G. Solomon C.**Title****Benzydamine hydrochloride** (Andolex)

improves oral mucosal health in the immunocompromised patient [letter]

[published erratum appears in S Afr Med J 1996 Dec;86(12):1566].

**Source**

South African Medical Journal. 86(9):1136-7, 1996 Sep.

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**Citation 10****Unique Identifier**

97024242

**Authors**Rabinovich IM. Banchenko GV. Rabinovich OF. Bezrukova IV.**Title**

[The use of the preparation Tantum Verde in treating diseases of the oral mucosa]. [Russian]

**Source**

Stomatologiya. 75(4):20-2, 1996.

**Abstract**

The results of a clinical observation of 30 patients with oral mucosa disease are presented in the article. All patients got "Tantum Verde" as a local treatment in the dose of 15.0 ml 4 times a day for 6 days. The efficiency of the medicine as a mean of symptomatic therapy of acute and chronic oral mucosa diseases is proved as well as prospects for its use both separately and for complex therapy of these diseases.

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**Citation 11****Unique Identifier**

97056819

**Authors**Fanaki NH. El-Nakeeb MA.**Institution**

Department of Pharmaceutical Microbiology, Alexandria University, Egypt.

**Title**Antibacterial activity of **benzydamine** and antibiotic-**benzydamine** combinations against multifold resistant clinical isolates.**Source**

Arzneimittel-Forschung. 46(3):320-3, 1996 Mar.

**Abstract**

The bactericidal activity of 0.1% **benzylamine** (CAS 642-72-8, BD), a non-steroidal anti-inflammatory agent was evaluated by the viable count technique against 12 multifold resistant clinical isolates. An efficient rapid activity was obtained irrespective of the antibiotic resistance pattern. Combinations of 0.1% BD and ampicillin, chloramphenicol or tetracycline exerted synergistic bactericidal activity against antibiotic resistant *Pseudomonas aeruginosa* and *Staphylococcus aureus* isolates. Using the chessboard technique, out of 114 BD-antibiotic bacteriostatic combinations, 19 were partially synergistic and the remaining were indifferent. The effect of subinhibitory concentrations of BD-ampicillin, BD-chloramphenicol and BD-tetracycline on the growth of the test organisms revealed significant synergism, especially with tetracycline combinations, most likely due to enhanced uptake of the antibiotic by the organisms in the presence of BD.

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Go to ... [Help](#) | [Logoff](#)

**Citation 12****Unique Identifier**

96353781

**Authors**[Carlucci G.](#) [Mazzeo P.](#)**Institution**

Dipartimento di Chimica, Universita dell' Aquila, Italy.

**Title**

High-performance liquid chromatographic determination of 1-benzyl-1H-indazol-3-ol in **benzylamine** in pharmaceutical formulations.

**Source**

Journal of Pharmaceutical &amp; Biomedical Analysis. 14(5):655-7, 1996 Mar.

---

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**Citation 13****Unique Identifier**

96192039

**Authors**[Jez JM.](#) [Vanderkooi JM.](#) [Laties AM.](#)**Institution**

Johnson Research Foundation, Department of Biochemistry and Biophysics,  
University of Pennsylvania School of Medicine, Philadelphia 19104, USA.

**Title**

Spectroscopic characterization of bendazac and **benzylamine**:  
possible photochemical modes of action.

**Source**

Biochemical & Biophysical Research Communications. 221(2):266-70, 1996 Apr  
16.

**Abstract**

The involvement of near-UV light in cataract development suggests that potential anti-cataract drugs may display unusual spectroscopic properties. As bendazac impedes certain effects associated with lens opacification, we have characterized the singlet and triplet states of bendazac and its analog, **benzylamine**, by fluorescence and phosphorescence methods. These compounds have much shorter triplet state lifetimes compared to the triplet state lifetimes observed in proteins. Our results raise the possibility that the photoprotective action of these compounds may result from their ability to dissipate energy through the triplet state. We propose alternative modes for the photoprotective actions of these compounds.



Chlorine dioxide



Results of your search : from 2 [limit 1 to english language] keep 5-6,14-15,22,27,31

Citations available: 7

Citations displayed: 1-7

Go to ... [Help](#) | [Logoff](#)

## Citation 1

## Unique Identifier

98421238

## Authors

Boddie RL. Nickerson SC. Adkinson RW.

## Institution

Mastitis Research Laboratory, Louisiana State University Agricultural Center,  
Homer 71040, USA.

## Title

Germicidal activity of a chlorous acid-**chlorine dioxide** teat dip and a sodium chlorite teat dip during experimental challenge with *Staphylococcus aureus* and *Streptococcus agalactiae*.

## Source

Journal of Dairy Science. 81(8):2293-8, 1998 Aug.

## Abstract

Three postmilking teat dips were tested for efficacy against *Staphylococcus aureus* and *Streptococcus agalactiae* in two separate studies using experimental challenge procedures that were recommended by the National Mastitis Council. The first study evaluated a barrier teat dip product containing chlorous acid-**chlorine dioxide** as the germicidal agent, and the second study evaluated a sodium chlorite product with a barrier component as well as a sodium chlorite product without a barrier component. The chlorous acid-**chlorine dioxide** teat dip reduced new intramammary infections (IMI) caused by *Staph. aureus* by 91.5% and reduced new IMI caused by *Strep. agalactiae* by 71.7%. The barrier dip containing sodium chlorite reduced new IMI caused by *Staph. aureus* and *Strep. agalactiae* by 41.0 and 0%, respectively. The nonbarrier dip containing sodium chlorite reduced new IMI caused by *Staph. aureus* by 65.6% and reduced new IMI caused by *Strep. agalactiae* by 39.1%. Teat skin and teat end conditions were evaluated before and after the second study; no deleterious effects among dipped quarters compared with control quarters were noted for the two sodium chlorite products.

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## Citation 2

## Unique Identifier

98374908

## Authors

Foschino R. Nervegna I. Motta A. Galli A.

## Institution

Dipartimento di Scienze e Tecnologie Alimentari e Microbiologiche, Università degli Studi di Milano, Italy.

**Title**

Bactericidal activity of **chlorine dioxide** against *Escherichia coli* in water and on hard surfaces.

**Source**

Journal of Food Protection. 61(6):668-72, 1998 Jun.

**Abstract**

The efficacy of **chlorine dioxide** as a disinfectant was evaluated against cells of *Escherichia coli* ATCC 11229 in aqueous suspension and adhering to the surfaces of stainless steel AISI 304 and PVC. The concentrations tested ranged from 0.7 to 14 mg/liter; the exposure times investigated were 30 s and 1, 2, 4, and 8 min. When the bacteria were suspended in water with 1.4 mg/liter of **chlorine dioxide**, a 10(5)-fold reduction of the initial viable count occurred within 30 s; when cells were attached to the steel surface, the same rate of inactivation took place only after 6 min with 7 mg/liter or 4 min with 14 mg/liter of **chlorine dioxide**. A 5-log reduction was not obtained when organisms were adhered to polyvinyl chloride (PVC). Scanning electron microscope micrographs of contaminated surfaces revealed that the PVC was very rough with pores much larger in diameter than the cells. Time values determining a 90% reduction of the *E. coli* population (90% killing time) were calculated for each concentration of disinfectant tested in suspension and on the steel surface. If the same experimental conditions were strictly adopted, linear functions of the log of bacterial inactivation could be plotted (log 90% killing time versus log concentration of disinfectant). This work showed that results obtained with suspension tests could not be used to estimate disinfection of hard surfaces.

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**Citation 3****Unique Identifier**

97408325

**Authors**

Palo TD. Atti M. Bellantuono R. Giordano M. Caringella DA.

**Institution**

Pediatric Nephrology and Dialysis Division, Children's Hospital Giovanni XXIII, Bari, Italy.

**Title**

**Chlorine dioxide**: a new agent for dialysis monitor disinfection in a pediatric center.

**Source**

Blood Purification. 15(3):188-94, 1997.

**Abstract**

In order to evaluate the bacterial and endotoxin contamination in the dialysis fluids of our pediatric center and the effectiveness of **chlorine dioxide** (CD) compared with a conventional method, (1) deionized water, (2) dialysate fluid, (3) basic concentrate, and (4) acid concentrate were tested in 4 dialysis machines. Monitor sterilization was made using CD in protocol A and sodium hypochlorite/acetic acid in protocol B. Once every 2 weeks the deionized water set of distribution was routinely disinfected with peracetic acid. Each protocol lasted 1 months and the samples were taken, under aseptic conditions, on the 15th, 22nd and 27th day. All samples, at all stages of the

study, showed an endotoxin concentration below the limits recommended by the Canadian Standard Association. Fifty-nine out of 72 samples in A and 62 out of 72 samples in B showed a bacterial count within the range recommended by the Association for the Advancement of Medical Instrumentation. The data show that both protocols produced the same results. However, protocol A is to be preferred for its simultaneous disinfecting-cleaning and descaling activity which proves time-saving.

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#### Citation 4

**Unique Identifier**

98021123

**Authors**Yates R. Moran J. Addy M. Mullan PJ. Wade WG. Newcombe R.**Institution**

Division of restorative Denistry, Dental School, Bristol, UK.

**Title**

The comparative effect of acidified sodium chlorite and chlorhexidine mouthrinses on plaque regrowth and salivary bacterial counts.

**Source**

Journal of Clinical Periodontology. 24(9 Pt 1):603-9, 1997 Sep.

**Abstract**

Acidified sodium chlorite (ASC) is recognised as a highly potent, broad spectrum antimicrobial system that has been successfully developed for uses in veterinary, food processing and medical device fields. The current studies aimed to investigate the persistence of antimicrobial action and plaque inhibitory properties of 3 ASC mouthrinses by comparison with positive control, chlorhexidine 0.12%, and placebo control, water, rinses. Both studies were randomised, double-blind, cross-over 5-cell designs balanced for carryover. The 1st study involved 15 healthy subjects who immediately before and at 30, 60, 180, 300 and 420 min after rinsing provided 2 ml saliva samples. The samples were immediately processed for total anaerobic bacterial counts recorded after 96 h incubation. Washout periods were a minimum of 3 days. The second study involved 20 healthy subjects who on day 1 of each study were rendered plaque free, suspended normal oral hygiene methods and commenced rinsing twice daily with the allocated rinse. On day 5, plaque was scored by index and area after disclosing with erythrosin. Washout periods were 2 1/2 days. The 3 ASC and chlorhexidine rinses produced similar reductions in salivary bacterial counts which remained significantly below the placebo control to 7 h. There were no significant differences between ASC and chlorhexidine rinses except at 30 and 60 min when significantly greater reductions were produced by 2 ASC rinses compared to the chlorhexidine rinse. Plaque indices and areas were considerably and significantly lower with the ASC and chlorhexidine rinses compared to the placebo rinse. There were no significant differences between plaque scores for the 3 ASC rinses and the chlorhexidine rinse, although for 2 ASC rinses plaque scores were lower than for the chlorhexidine rinse. The results indicate that the 3 ASC rinses have equivalent plaque inhibitory action to chlorhexidine as a rinse. Similar to chlorhexidine, the plaque inhibitory action of the rinses appears to be derived from a persistence of antimicrobial action in the mouth.

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### Citation 5

**Unique Identifier**

98014894

**Authors**Zanetti F. Stampi S. De Luca G. Varoli O. Tonelli E.**Institution**

Department of Medicine and Public Health, University of Bologna, Italy.

**Title**Comparative disinfection of secondary-treated sewage with  
**chlorine dioxide** and bromine chloride.**Source**

Zentralblatt fur Hygiene und Umweltmedizin. 198(6):567-79, 1996 Jul.

**Abstract**

A comparison was made of the inactivation rates of *Arcobacter butzleri*, coliphages, total coliforms, fecal coliforms, fecal streptococci and heterotrophic plate count in secondary sewage effluent using **chlorine dioxide** (2 and 4 ppm) and bromine chloride (4 or 8 and 12 ppm) as disinfecting agents. Using these doses the ClO<sub>2</sub> gave higher reduction percentages (on average more than 99% at 4 ppm) than those obtained with BrCl. The average values of the fecal indicators are well within the legal limits. *Arcobacter butzleri* was more sensitive to the disinfectants than other bacteria while fecal streptococci were seen to be more resistant. From the chemical point of view no differences were seen between the two disinfectants except that the action of ClO<sub>2</sub> was stronger regarding BOD<sub>5</sub> than that of BrCl. With the exception of dichloromethane, the concentration of volatile halogenated compounds showed little variation and values were often lower than detection limits.

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### Citation 6

**Unique Identifier**

97066219

**Authors**Morrissey RF.**Title**

Changes in the science of sterilization and disinfection.

**Source**

Biomedical Instrumentation &amp; Technology. 30(5):404-6, 1996 Sep-Oct.

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### Citation 7

**Unique Identifier**

96249929

**Authors**Hamilton E. Seal DV. Hay J.**Title**

Comparison of **chlorine** and **chlorine dioxide** disinfection for control of Legionella in a hospital potable water supply [letter] [see comments].

**Comments**

Comment in: J Hosp Infect 1997 Oct;37(2):165-7; discussion 169-71, Comment in: J Hosp Infect 1997 Oct;37(2):167-9; discussion 169-71

**Source**

Journal of Hospital Infection. 32(2):156-60, 1996 Feb.



# **EXHIBIT 11**



Results of your search : from 1 ["TDMAC".mp.] keep 1-3

Citations available: 3

Citations displayed: 1-3

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### Citation 1

**Unique Identifier**

98089396

**Authors**

[Ritter EF.](#) [Fata MM.](#) [Rudner AM.](#) [Klitzman B.](#)

**Institution**

Division of Plastic, Reconstructive, Oral, and Maxillofacial Surgery, Duke University, Durham, N.C., USA.

**Title**

Heparin bonding increases patency of long microvascular prostheses.

**Source**

Plastic & Reconstructive Surgery. 101(1):142-6, 1998 Jan.

**Abstract**

The high thrombogenicity of synthetic biomaterials has limited their use for reconstructive microsurgery. Prime factors in the thrombogenicity of synthetic materials in contact with blood include gas nuclei at the blood gas interface as well as the inherent thrombogenicity of the materials themselves. Expanded polytetrafluoroethylene (ePTFE) vascular prostheses were denucleated by placement in acetone and ethanol followed by degassed saline or by placement in degassed saline subjected to hydrostatic pressure. Heparinized grafts were prepared by coating with tridodecylmethylammonium chloride (TDMAC), followed by immersion in heparin. Grafts were installed to reconstruct the femoral artery (1 x 10 mm) or as renal-iliac bypasses (1 x 50 mm) in rats. In the femoral artery reconstruction model, control grafts thrombosed within 10 minutes of implantation. All acetone denucleated femoral grafts remained patent for 60 minutes but were occluded at day 1. All pressure denucleated femoral grafts remained patent for 60 minutes, whereas six were patent at 1 month. In contrast, 11 of 15 heparinized femoral grafts were patent at 1 month. In the renal iliac bypass model, all control grafts were thrombosed within 10 minutes, whereas all heparin bonded grafts remained patent at 1 month. This finding confirms that removal of air from small diameter ePTFE grafts decreases acute thrombogenicity and that heparin bonding further decreases thrombogenicity, suggesting that clinically useful lengths of microvascular prostheses may be possible.

---

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### Citation 2

**Unique Identifier**

98036628

**Authors**

[Ritter EF.](#) [Kim YB.](#) [Reischl HP.](#) [Serafin D.](#) [Rudner AM.](#) [Klitzman B.](#)

**Institution**

Department of Surgery, Duke University Medical Center, Durham, N.C.  
27710-3906, USA.

**Title**

Heparin coating of vascular prostheses reduces thromboemboli.

**Source**

Surgery. 122(5):888-92, 1997 Nov.

**Abstract**

**BACKGROUND:** Synthetic conduits made from currently available materials are suboptimal for use in small-diameter vascular reconstruction because of their high surface thrombogenicity, which leads to failure. **METHODS:** In this study control, heparin-irrigated, or heparin-bonded expanded polytetrafluoroethylene (ePTFE) grafts (4 mm long by 1 mm inner diameter) were implanted to reconstruct the iliac artery in male rats. The cremaster muscle was isolated as an island flap based on branches of the iliac artery downstream from the graft. Emboli were quantitated by using intravital fluorescent microscopy of the cremaster muscle's microcirculation. **RESULTS:** The mean number of emboli observed per animal during a 20-minute period was 91 for the control group, 84 for the heparin-irrigated group, and 22 for the tridodecylmethylammonium chloride (TDMAC)-heparin group. The mean area of each embolus was 1057 microns<sup>2</sup> for control, 940 microns<sup>2</sup> for heparin-irrigated, and 808 microns<sup>2</sup> for TDMAC-heparin-coated grafts ( $p < 0.05$  for TDMAC-heparin versus control or heparin-irrigated). **CONCLUSIONS:** A TDMAC-heparin coating of ePTFE microvascular prostheses significantly reduces downstream microemboli.

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**Citation 3****Unique Identifier**

97293290

**Authors**

[Hamilton AJ.](#) [Orozco J.](#) [Narotam P.](#) [Bowersock T.](#)

**Institution**

Department of Surgery, University of Arizona Health Sciences Center, Tucson,  
USA.

**Title**

Efficacy of vancomycin/tri-iododecylmethyl ammonium chloride-coated  
ventriculostomy catheters in reducing infection.

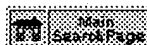
**Source**

Neurosurgery. 40(5):1043-9, 1997 May.

**Abstract**

**OBJECTIVE:** The biotoxicity of tri-iododecylmethyl ammonium chloride (TDMAC)-coated catheters in the brain was tested, as was the efficacy of the vancomycin-bonded, TDMAC-coated catheters to inhibit staphylococcal growth in vitro and to delay the onset of clinical manifestations of catheter-related staphylococcal ventriculitis in rabbit experimental model. **METHODS:** The brain toxicity of the TDMAC-coated catheters was tested in New Zealand White rabbits. The efficacy of the vancomycin-bonded, TDMAC-coated catheters in the inhibition of staphylococcal growth was tested in agar seeded with *Staphylococcus aureus* and *Staphylococcus epidermidis* strains. Sections of vancomycin-bonded, TDMAC-coated catheters were placed in saline solution for testing of drug release over time. Stereotactic placement of ventriculostomy catheters was performed in two groups

of New Zealand White rabbits. In the experimental group, vancomycin-bonded, **TDMAC**-coated catheters were used. In the control group, **TDMAC**-coated catheters were used. Staphylococcal colonies were inoculated at the exit site of the catheters. Culture of the catheter tips was performed at the time of death of the animals. **RESULTS:** No toxic reactions were seen at the implantation sites or in surrounding brain. Significant inhibition of growth of both *S. aureus* and *S. epidermidis* was noted with the vancomycin-bonded catheters ( $P = 0.01$ ). Vancomycin continued to be released from catheters for the full 6 days of the study. The median interval to development of clinical manifestations of ventriculitis among the experimental group of rabbits was 53 days; among the control group, the interval was 27 days ( $P < 0.001$ ). **CONCLUSION:** Vancomycin-bonded, **TDMAC**-coated ventriculostomy catheters bind and release the drug at levels exceeding the minimum inhibitory concentration for *S. aureus* and *S. epidermidis* for at least 6 days and can significantly delay the onset of infectious ventriculitis in a rabbit model.



# **EXHIBIT 12**



## Gentian Violet

### Genapax®

- [Classification](#)
- [Indications](#)
- [Comments](#)

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### Classification

>Dermatological Agents  
  >Topical Antiinfectives  
    >Antifungals

- OTC
- pregnancy category C
- VA classification DE102

### Indications

- Candida albicans
- candidiasis
- skin and skin structure infections

### Comments

**Description:** Gentian violet is a topical antifungal and antibacterial agent. It is used as a topical antiinfective for skin infections and vaginal or oral candidiasis. Gentian violet is a dye and can cause staining of clothing and cosmetic effects, so usually another antifungal preparation is selected. Gentian violet is sometimes used for Candida albicans infections refractory to newer, more cosmetically appealing agents. This drug was approved by the FDA in 1939.

**Contraindications/Precautions:** Ulcerated areas; porphyria.

**Drug Interactions:** No significant interactions.

**Adverse Reactions:** Staining of skin and clothing. May cause esophagitis, local burning and skin reactions when used on oral mucosa or other mucus membranes.

#### Dosage

General topical application:

Adults and Children: 1% or 2% solution to affected area twice daily. If used on the oral mucosa, avoid swallowing.

Infants: For refractory oral candidiasis†, apply 3—4 drops of a 0.5% solution under the tongue or on lesions after feeding. Use sparingly.

Vaginal dosage:

Insert one 5 mg tampon intravaginally for 3—4 hours. Use once or twice per day for 12 days.



†-non-FDA-approved indication

[Revised 5/15/1996]

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*antiseptic*Complete record☐ Citation 9**Unique Identifier**

98066955

**Authors**Yasuda T. Yoshimura Y. Takada H. Kawaguchi S. Ito M. Yamazaki F. Iriyama J. Ishigo S. Asano Y.**Institution**

Pharmaceutical Division, Ogaki Municipal Hospital, Japan.

**Title**

Comparison of bactericidal effects of commonly used antiseptics against pathogens causing nosocomial infections. Part 2.

**Source**

Dermatology. 195 Suppl 2:19-28, 1997.

**Abstract**

Opportunistic infections caused by gram-negative rods (GNR), conventionally regarded as organisms with low or no pathogenicity, and intractable infections caused by various resistant organisms pose a great problem now. In view of this, we determined the bactericidal effects of 5 commonly used disinfectants using as the test strains *Xanthomonas maltophilia* and *Serratia marcescens*, chosen among other GNR since they often cause nosocomial infections. Regarding the bactericidal activities against *X. maltophilia* and *S. marcescens*, both sensitive strains and resistant strains were killed within 20 s of exposure to povidone-iodine and **sodium hypochlorite**. With chlorhexidine, 1 strain each of both species was not killed within 10 min of exposure at a concentration of 0.2%. Both sensitive strains and resistant strains of *X. maltophilia* were killed within 20 s of exposure to benzalkonium at 0.02%, while a concentration of 0.1% was required for benzalkonium to kill *S. marcescens* within 20 s. With Tego-51, both sensitive strains and resistant strains of *X. maltophilia* were killed within 20 s at 0.02%, while 1 strain of *S. marcescens* was not killed within 20 s at a concentration of 0.1%. In the use of disinfectants, comparative bactericidal effects of various disinfectants against clinical isolates should be taken into consideration.



Complete record☐ Citation 10**Unique Identifier**

98066953

**Authors**Lanker Klossner B. Widmer HR. Frey F.**Institution**Department of Internal Medicine, Nephrology, University Hospital of Berne,  
Switzerland.**Title**

Nondevelopment of resistance by bacteria during hospital use of povidone-iodine.

**Source**

Dermatology. 195 Suppl 2:10-3, 1997.

**Abstract**

Since the bacterial ability to develop resistance against various factors of their surroundings is a well-known phenomenon, resistance against iodine and specifically against povidone-iodine (PVP-I) has been widely investigated. Yet there is little known about bacterial resistance in long-term daily use of disinfectants in continuous ambulatory peritoneal dialysis (CAPD) patients. The aim of our study was to investigate whether on daily use of PVP-I over a period of at least 6 months coagulase-negative staphylococci (CNS)--the predominant infective organisms of peritonitis--developed resistance against PVP-I. At the catheter exit site of 40 CAPD patients we isolated 36 CNS. 23 CNS (CNS + PVP) originate from patients using PVP-I, 13 CNS (CNS + Cl) from patients using **sodium hypochlorite** (NaOCl) as disinfectant. The strains were biotyped, antibiotic resistance patterns were determined and resistance against PVP-I or NaOCl was calculated as reduction factor using the quantitative suspension test combined with a turbidimetric standardization. Resistance against PVP-I 0.01% and against NaOCl 0.005% was determined at two contact times (30 and 300 s) for each patient group. In addition, we investigated the effects of plasmid loss on sensitivity to PVP-I. Out of 5 multiple-antibiotic-resistant CNS, 3 strains showed no difference in reduction factor against PVP-I before and after curing. There was no significant difference in reduction factor against NaOCl. CNS + PVP were even significantly more sensitive to PVP-I than CNS + Cl. Taken together, our results demonstrate that long-term use of PVP-I does not cause any bacterial resistance in CNS of CAPD patients.



# **EXHIBIT 13**

*Castile Soap*

Results of your search : from 3 [1 and 2] keep 1-4

Citations available: 4

Citations displayed: 1-4

Go to ... [Help](#) | [Logoff](#)

### Citation 1

#### Unique Identifier

99333357

#### Authors

Conroy BP. Anglen JO. Simpson WA. Christensen G. Phaup G. Yeager R. Gainor BJ.

#### Institution

Department of Orthopaedic Surgery, The University of Missouri-Columbia, USA.

#### Title

Comparison of castile soap, benzalkonium chloride, and bacitracin as irrigation solutions for complex contaminated orthopaedic wounds.

#### Source

Journal of Orthopaedic Trauma. 13(5):332-7, 1999 Jun-Jul.

#### Abstract

**OBJECTIVE:** The purpose of the present study was to determine the effects of cleaning a contaminated orthopaedic wound with different classes of wound irrigation solutions. **STUDY DESIGN:** Rats with a contaminated orthopaedic wound were randomized into treatment groups: normal saline (NS), castile soap (CS), benzalkonium chloride (BzC), bacitracin (Abx), or sequential irrigation with BzC, CS, and NS. **INTERVENTION:** *Pseudomonas aeruginosa* [*P. aeruginosa*; 1 x 10(6) colony-forming units (CFU)], or *Staphylococcus aureus* (*S. aureus*; 1 x 10(6) CFU) were placed into a paravertebral wound (containing a wire implant placed through a spinous process) and allowed to incubate for fifteen minutes. The wound was then irrigated with three liters of either NS, 0.05 percent CS, 0.03 percent BzC, Abx (33,000 units per liter) or underwent a sequential irrigation treatment (one liter each of BzC, CS, NS). **MAIN OUTCOME MEASUREMENTS:** The animals were observed daily for wound complications for fourteen days and then killed, and cultures of the wound were obtained. **RESULTS:** *Pseudomonas aeruginosa*: Both CS and the sequential irrigation treatment significantly lowered the rate of positive wound cultures when compared with NS ( $p < 0.05$ ). Irrigation with BzC resulted in a higher rate of positive wound cultures and complications. The sequential irrigation treatment prevented the wound complications associated with irrigation with BzC alone. *Staphylococcus aureus*: Only BzC irrigation significantly lowered the rate of positive wound cultures when compared with NS ( $p < 0.05$ ). **CONCLUSION:** The rate of positive wound cultures due to *P. aeruginosa* is effectively reduced by irrigation with CS alone or by the sequential irrigation treatment. When used alone, the antiseptic BzC results in a higher rate of positive wound cultures and wound complications. The wound complications seen with irrigation with BzC alone are prevented by the sequential irrigation treatment (BzC followed by CS and NS). The rate of positive wound cultures in this model due to *S. aureus* is not decreased by irrigation with CS; however, the rate of positive wound cultures is safely and effectively decreased with the use of BzC.

---

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## Citation 2

Iodine Toxicosis

## Unique Identifier

99153812

## Authors

Aiba M. Ninomiya J. Furuya K. Arai H. Ishikawa H. Asaumi S. Takagi A. Ohwada S. Morishita Y.

## Institution

Department of Surgery, Fujiyoshida City Hospital, Yamanashi, Japan.

## Title

Induction of a critical elevation of povidone-iodine absorption in the treatment of a burn patient: report of a case. [Review] [10 refs]

## Source

Surgery Today. 29(2):157-9, 1999.

## Abstract

A critical elevation of povidone-iodine absorption which occurred in a burn patient who was topically treated with 10% povidone-iodine (PI) gel is herein reported. A 65-year-old man was admitted to our hospital for deep second- and third-degree burns covering 26% of his total body surface area. The intravenous administration with lactated Ringer's solution and topical treatment with silver sulfadiazine were applied in addition to such treatments as debridement and skin grafting. However, wound infection occurred due to *Pseudomonas aeruginosa*. Topical treatment with PI gel was effective for this condition. Persistent nodal bradycardia with hypotension, metabolic acidosis, and renal failure occurred 16 days after the start of PI gel treatment. Iodine toxicosis caused by PI gel was suspected with a serum iodine level of 20600 microg/dl (normal range 2-9 microg/dl). The PI gel treatment was therefore discontinued immediately, and hemodialysis was scheduled. However, the patient's family refused hemodialysis and he died 44 days after admission. To our knowledge, only eight patients with iodine toxicosis have been reported in burn patients treated with PI gel. [References: 10]

Go to ... [Help](#) | [Logoff](#)

## Citation 3

## Unique Identifier

98066957

## Authors

Michel D. Zach GA.

## Institution

Swiss Paraplegic Center, Nottwil, Switzerland.

## Title

Antiseptic efficacy of disinfecting solutions in suspension test in vitro against methicillin-resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli* in pressure sore wounds after spinal cord injury.

## Source

Dermatology. 195 Suppl 2:36-41, 1997.

## Abstract

In pressure sore wounds after spinal cord injury, methicillin-resistant *Staphylococcus aureus* can be

Povidone iodine  
Betadine  
Braunol  
Chlorhexidine

detected in 2% of the cases. The elimination of the germ is the aim of the treatment. Pressure sore wounds are an often found complication after spinal cord injury. For **local** treatment five commercially available **antiseptics** for the skin and mucous membrane were tested in vitro. The method used is a modified qualitative and quantitative suspension test. The **antiseptics** were tested without and with addition of 5% albumin in order to simulate the conditions of the wound in vivo. The results show a superior efficacy of the **povidone-iodine** preparations. Betadine, probably due to the higher concentration, is more efficacious than **Braunol**; chlorhexidine is sufficiently efficacious without the addition of albumin. These results still have to be confirmed by in vivo studies.

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#### Citation 4

**Unique Identifier**

97297352

**Authors**Wilson AP. Lewis C. O'Sullivan H. Shetty N. Neild GH. Mansell M.**Institution**

Department of Clinical Microbiology, University College London Hospitals, UK.

**Title**

The use of povidone iodine in exit site care for patients undergoing continuous peritoneal dialysis (CAPD).

**Source**

Journal of Hospital Infection. 35(4):287-93, 1997 Apr.

**Abstract**

Exit site infection is a major risk factor for the development of peritonitis in continuous ambulatory peritoneal dialysis. The frequency of infection can be reduced by scrupulous exit site care with or without topical **antiseptics**. A randomized trial was performed of 149 catheters in 130 patients to assess any additional benefits conferred by the use of **povidone iodine dry powder spray** at dressing changes over an existing strict protocol of exit care. **Exit infections** occurred in 14 (18%) of 77 patients using spray and in 15 (21%) of 72 patients not using spray. The risk of peritonitis was also similar in each group. The proportion of **infections** caused by *Staphylococcus aureus* was reduced in the spray group, but those caused by *Pseudomonas aeruginosa* were increased. Rash occurred in 6% of those using the spray. The use of the spray did not therefore seem justified.





Results of your search : from 1 [Pseudomonas infections/ or antipseudomonal.mp.] keep 2,9-10,15,21,24-25,32,45,77,84,90-91,113,126,152,154,188-190

Citations available: 20

Citations displayed: 1-20

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### Citation 1

**Unique Identifier**

20052302

**Authors**

Nakae H. Inaba H. Endo S.

**Institution**

Department of Emergency and Critical Care Medicine, Akita University School of Medicine, Japan. [nakaeh@doc.med.akita-u.ac.jp](mailto:nakaeh@doc.med.akita-u.ac.jp)

**Title**

Usefulness of procalcitonin in **Pseudomonas** burn wound sepsis model.

**Source**

Tohoku Journal of Experimental Medicine. 188(3):271-3, 1999 Jul.

**Abstract**

Procalcitonin (PCT), a precursor of calcitonin, and endotoxin were determined in the burn wound sepsis model in which 21 Sprague-Dawley rats were scalded approximately 30% on their back. On day 2 post burn, the wounds were inoculated  $1 \times 10^8$  colony-forming units of **Pseudomonas aeruginosa**. On day 5 post burn *P. aeruginosa* was detected by blood culture in 10 of the 21 rats (47.6%). The mortality rate 7 days after burn was 90.5%. Significant correlations were observed between serum endotoxin levels and serum PCT levels on day 5 post burn ( $r = 0.860$ ,  $p < 0.001$ ). It was suggested that endotoxin may induce the release of PCT and that measuring the levels of PCT may be useful in diagnosing burn wound sepsis.

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### Citation 2

**Unique Identifier**

20016518

**Authors**

Lee NG. Jung SB. Ahn BY. Kim YG. Lee Y. Jeon YJ. Park WJ.

**Institution**

Department of Biomedical Science, R&D Center, Cheiljedang Inc., Ichon, Kyonggi, South Korea.

**Title**

Protection of mice against *P. aeruginosa* infections by large-scale affinity-purified human IgG specific to *P. aeruginosa* outer membrane proteins.



**Source**

Vaccine. 18(7-8):665-74, 1999 Nov 12.

**Abstract**

In order to develop an effective means to treat **Pseudomonas aeruginosa infections**, we designed a large-scale process for purification of human IgG specific to P. aeruginosa outer membrane proteins (Oprs) from normal human sera. The process we developed includes affinity column chromatography using P. aeruginosa Oprs as ligands, protein A column chromatography and ultrafiltration, which enriched P. aeruginosa Oprs-specific IgG antibody by 500-fold. The purified anti-Oprs IgG was specific to the Oprs as confirmed by an ELISA competition assay and retained opsonophagocytic-killing capacity. In vivo protective efficacy of anti-Oprs IgG was evaluated by passive protection assays in mice where the 50% protective dose of anti-Oprs IgG against P. aeruginosa **infections** was 41 microg/kg, which was 20 times lower than that of normal serum IgG. When administered to mice 3 h after bacterial challenge, only anti-Oprs IgG afforded protection. These data demonstrate the feasibility of use of the purification process in producing functionally active target-specific human antibodies for clinical use and provide a rationale for use of anti-Oprs IgG as a valuable adjunct to treat P. aeruginosa **infections**.

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**Citation 3****Unique Identifier**

20071243

**Authors**

Nunez Sanchez JC. Catala Barcelo MT. Navarro Obrer I. Balaguer Martinez JV.

**Title**

[Treatment of urinary tract **infections** in patients with risk factors (letter)]. [Spanish]

**Source**

Medicina Clinica. 113(8):319, 1999 Sep 18.

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**Citation 4****Unique Identifier**

20100050

**Authors**

DeWitt RC. Wu Y. Renegar KB. King BK. Li J. Kudsk KA.

**Institution**

Department of Surgery, University of Tennessee, Memphis 38163, USA.

**Title**

Bombesin recovers gut-associated lymphoid tissue and preserves immunity to bacterial pneumonia in mice receiving total parenteral nutrition [see comments].

**Comments**

Comment in: Ann Surg 2000 Jan;231(1):9-10

**Source**

Annals of Surgery. 231(1):1-8, 2000 Jan.

**Abstract**

**OBJECTIVE:** To study the ability of bombesin (BBS) to recover gut-associated lymphoid tissue (GALT) and preserve immunity in a lethal model of *Pseudomonas aeruginosa* (Ps) pneumonia in mice receiving total parenteral nutrition (TPN). **SUMMARY BACKGROUND DATA:** TPN causes depression of mucosal immunity compared with enterally fed animals, which may explain the increased incidence of pneumonia in parenterally fed trauma patients. BBS prevents this TPN-induced GALT atrophy, depressed gastrointestinal and respiratory tract IgA levels, and impaired antiviral IgA-mediated mucosal immunity. The authors examined whether some supplement could be added to TPN to avoid this GALT atrophy and lower the incidence of infectious complications in the parenterally fed animal. **METHODS:** Male mice were randomized to chow or intravenous (IV) TPN. After 5 days of IV TPN, mice received 0, 1, 2, or 3 days of BBS IV three times a day and then were killed to harvest Peyer's patch, intraepithelium, and lamina propria for cell yields. Gastrointestinal and respiratory tract IgA levels were analyzed by enzyme-linked immunosorbent assay. Next, mice underwent intranasal inoculation with liposomes alone (nonimmune) or liposome-containing Ps polysaccharide. Ps immune mice were catheterized and randomized to chow, IV TPN, or IV TPN + BBS. The liposome group received chow but no IV catheter. These mice were given an LD90 dose of intratracheal Ps, and death rates were recorded. **RESULTS:** GALT and gastrointestinal and respiratory tract IgA levels improved to those in chow-fed mice after 3 days of BBS. Immunization reduced the death rate from 92% in chow-fed liposome-only animals to 20% in immunized animals. TPN-fed animals lost their mucosal immunity, with a death rate of 86% compared with 21% in the TPN + BBS group. **CONCLUSION:** The results demonstrate that BBS reverses TPN-induced changes in GALT and preserves mucosal immunity. Ps immunization reduces the death rate in a gram-negative pneumonia model and maintains gastrointestinal and respiratory immunity in Ps immune mice receiving IV TPN.

---

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**Citation 5****Unique Identifier**

20072797

**Authors**

Wilmott RW. Kitzmiller JA. Szabo C. Southan GJ. Salzman AL.

**Institution**

Division of Pulmonary Medicine, The Children's Hospital Research Foundation,  
Cincinnati, OH, USA. wilmr0@chmcc.org

**Title**

Mercaptoethylguanidine inhibits the inflammatory response in a murine model  
of chronic infection with *Pseudomonas aeruginosa*.

**Source**

Journal of Pharmacology & Experimental Therapeutics. 292(1):88-95, 2000 Jan.

**Abstract**

Chronic airway inflammation induced by *Pseudomonas aeruginosa* is the eventual cause of respiratory failure in most people affected by cystic fibrosis. Recent evidence implicates the involvement of free radical and oxidant stress in the pathogenesis of the inflammatory injury. Here we report the efficacy of a novel experimental therapeutic, mercaptoethylguanidine (MEG), which

has combined actions as a selective inhibitor of the inducible nitric oxide synthase and as a scavenger of peroxynitrite, a potent oxidant formed in the reaction of nitric oxide and superoxide radical. Chronic pulmonary infection was established in FVB/N mice by intratracheal administration of 10(5) colony-forming units of *P. aeruginosa* in agar beads. Treatment with MEG (10 mg/kg/dose every 8 h i.p.) inhibited weight loss in the first 3 days and reduced histologic injury at 8 days postinfection. MEG also reduced myeloperoxidase activity, a marker of neutrophil infiltration, at 8 days and concentrations of the proinflammatory cytokines interleukin-1beta, tumor necrosis factor-alpha, and macrophage inflammatory protein 2 in whole lung homogenates. MEG-treated animals and controls had similar perioperative mortality and comparable colony counts of *P. aeruginosa* at 8 days, indicating that MEG did not exacerbate infection. Our data suggest that MEG may be an effective immunomodulatory therapy of pulmonary inflammation induced by chronic infection.

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### Citation 6

**Unique Identifier**

20021786

**Authors**Oie S. Sawa A. Kamiya A. Mizuno H.**Institution**Department of Pharmacy Clinical Laboratory, Yamaguchi University Hospital,  
1144 Kogushi, Ube 755, Japan.**Title**In-vitro effects of a combination of **antipseudomonal**  
antibiotics against multi-drug resistant **Pseudomonas**  
*aeruginosa*.**Source**

Journal of Antimicrobial Chemotherapy. 44(5):689-91, 1999 Nov.

**Abstract**

We evaluated the in-vitro effects of various combinations of five types of widely used **antipseudomonal** antibiotics (piperacillin, meropenem, ceftazidime, aztreonam and amikacin) against six **Pseudomonas aeruginosa** strains that were resistant to each of these antibiotics. Among two-drug combinations, the combinations of two beta-lactam antibiotics inhibited growth of one to three *P. aeruginosa* strains, while those of one beta-lactam antibiotic and amikacin inhibited growth of two to four strains. Among three-drug combinations, the combinations of three beta-lactam antibiotics inhibited growth of four to five strains, and those of two beta-lactam antibiotics and amikacin inhibited growth of five strains. These results suggest the potential usefulness of a combination of two beta-lactam antibiotics and amikacin or that of three beta-lactam antibiotics in treating multi-drug resistant *P. aeruginosa* **infections**.

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### Citation 7

**Unique Identifier**

20021779

**Authors**

Giacometti A. Cirioni O. Barchiesi F. Fortuna M. Scalise G.

**Institution**

Institute of Infectious Diseases and Public Health, University of Ancona,  
Italy. [cmalinf@popcsi.unian.it](mailto:cmalinf@popcsi.unian.it)

**Title**

In-vitro activity of cationic peptides alone and in combination with  
clinically used antimicrobial agents against **Pseudomonas**  
**aeruginosa**.

**Source**

Journal of Antimicrobial Chemotherapy. 44(5):641-5, 1999 Nov.

**Abstract**

The in-vitro activity of cecropin P1, indolicidin, magainin II, nisin and ranalexin alone and in combination with nine clinically used antimicrobial agents was investigated against a control strain, **Pseudomonas aeruginosa** ATCC 27853 and 40 clinical isolates of *P. aeruginosa*. Antimicrobial activities were measured by MIC, MBC and viable count. In the combination study, the clinically used antibiotics were used at concentrations close to their mean serum level in humans in order to establish the clinical relevance of the results. To select peptide-resistant mutants, *P. aeruginosa* ATCC 27853 was treated with consecutive cycles of exposure to each peptide at 1 x MIC. The peptides had a varied range of inhibitory values: all isolates were more susceptible to cecropin P1, while ranalexin showed the lowest activity. Nevertheless, synergy was observed when the peptides were combined with polymyxin E and clarithromycin. Consecutive exposures to each peptide at 1 x MIC resulted in the selection of stable resistant mutants. Cationic peptides might be valuable as new antimicrobial agents. Our findings show that they are effective against *P. aeruginosa*, and that their activity is enhanced when they are combined with clinically used antimicrobial agents, particularly with polymyxin E and clarithromycin.

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**Citation 8****Unique Identifier**

99037130

**Authors**

Nagoba BS. Deshmukh SR. Wadher BJ. Mahabaleshwar L. Gandhi RC. Kulkarni PB. Mane VA.  
Deshmukh JS.

**Institution**

Department of Microbiology, M.I.M.S.R. Medical College, Latur, India.

**Title**

Treatment of superficial pseudomonal **infections** with citric  
acid: an effective and economical approach [see comments].

**Comments**

Comment in: J Hosp Infect 1999 Apr;41(4):340

**Source**

Journal of Hospital Infection. 40(2):155-7, 1998 Oct.

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**Citation 9****Unique Identifier**

20015517

**Authors**Kharazmi A. Giwerzman B. Hoiby N.**Institution**Department of Clinical Microbiology, University Hospital (Rigshospitalet),  
University of Copenhagen, Denmark.**Title**

Robbins device in biofilm research.

**Source**

Methods in Enzymology. 310:207-15, 1999.

---

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**Citation 10****Unique Identifier**

99412728

**Authors**Tkachenko VL. Tsyganenko AIa. Liapunov NA. Bezuglaia EP. Minukhin VV.**Institution**

Kharkov State Medical University, Ukraine.

**Title**[An experimental validation of the use of levomycetin preparations for the  
treatment of burns infected with *Pseudomonas aeruginosa*].  
[Russian]**Source**

Mikrobiologichnyi Zhurnal. 61(3):30-6, 1999 May-Jun.

**Abstract**

Application of 1% of chloramphenicol (gel and cream) for local treatment of *Pseudomonas aeruginosa* burn infection has been studied in experiment. In vivo, both medical forms show pronounced therapeutic effect, they promote elimination of *P. aeruginosa* from wounds and decrease inflammation. In noninfected thermal trauma in laboratory animals application of gel and cream of chloramphenicol reduces transition from the phase of inflammation to the phase of reparation by 3-8 days and prevents infection of the burn wound by conditionally pathogenic microflora.

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**Citation 11****Unique Identifier**

99379695

**Authors**Levin AS. Barone AA. Penco J. Santos MV. Marinho IS. Arruda EA. Manrique EI. Costa SF.

**Institution**

Hospital Infection Control Department, Hospital das Clinicas, Faculdade de Medicina, University of Sao Paulo, SP, Brazil. nivel@usp.br

**Title**

Intravenous colistin as therapy for nosocomial **infections** caused by multidrug-resistant **Pseudomonas aeruginosa** and **Acinetobacter baumannii**.

**Source**

Clinical Infectious Diseases. 28(5):1008-11, 1999 May.

**Abstract**

Sixty nosocomial **infections** caused by **Pseudomonas aeruginosa** and **Acinetobacter baumannii** resistant to aminoglycosides, cephalosporins, quinolones, penicillins, monobactams, and imipenem were treated with colistin (one patient had two **infections** that are included as two different cases). The **infections** were pneumonia (33% of patients), urinary tract infection (20%), primary bloodstream infection (15%), central nervous system infection (8%), peritonitis (7%), catheter-related infection (7%), and otitis media (2%). A good outcome occurred for 35 patients (58%), and three patients died within the first 48 hours of treatment. The poorest results were observed in cases of pneumonia: only five (25%) of 20 had a good outcome. A good outcome occurred for four of five patients with central nervous system **infections**, although no intrathecal treatment was given. The main adverse effect of treatment was renal failure; 27% of patients with initially normal renal function had renal failure, and renal function worsened in 58% of patients with abnormal baseline creatinine levels. Colistin may be a good therapeutic option for the treatment of severe **infections** caused by multidrug-resistant *P. aeruginosa* and *A. baumannii*.

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**Citation 12****Unique Identifier**

99337068

**Authors**

Mathee K. Ciofu O. Sternberg C. Lindum PW. Campbell JJ. Jensen P. Johnsen AH. Givskov M. Ohman DE. Molin S. Hoiby N. Kharazmi A.

**Institution**

Department of Microbiology and Immunology, University of Tennessee and Veterans Affairs Medical Center, Memphis 38163, USA.

**Title**

Mucoid conversion of **Pseudomonas aeruginosa** by hydrogen peroxide: a mechanism for virulence activation in the cystic fibrosis lung.

**Source**

Microbiology. 145 ( Pt 6):1349-57, 1999 Jun.

**Abstract**

The leading cause of mortality in patients with cystic fibrosis (CF) is respiratory failure due in large part to chronic lung infection with **Pseudomonas aeruginosa** strains that undergo mucoid conversion, display a biofilm mode of growth in vivo and resist the infiltration of polymorphonuclear leukocytes (PMNs), which release free oxygen radicals such as H<sub>2</sub>O<sub>2</sub>. The mucoid phenotype among the strains infecting CF patients indicates overproduction of a linear polysaccharide called alginate. To mimic the inflammatory environment of the CF lung, *P. aeruginosa* PAO1, a typical

non-mucoid strain, was grown in a biofilm. This was treated with low levels of H<sub>2</sub>O<sub>2</sub>, as if released by the PMNs, and the formation of mucoid variants was observed. These mucoid variants had mutations in *mucA*, which encodes an anti-sigma factor; this leads to the deregulation of an alternative sigma factor (sigma22, AlgT or AlgU) required for expression of the alginate biosynthetic operon. All of the mucoid variants tested showed the same mutation, the *mucA22* allele, a common allele seen in CF isolates. The mucoid *mucA22* variants, when compared to the smooth parent strain PA01, (i) produced 2-6-fold higher levels of alginate, (ii) exhibited no detectable differences in growth rate, (iii) showed an unaltered LPS profile, (iv) were approximately 72% reduced in the amount of inducible-beta-lactamase and (v) secreted little or no LasA protease and only showed 44% elastase activity. A characteristic approximately 54 kDa protein associated with alginate overproducing strains was identified as AlgE (Alg76) by N-terminal sequence analysis. Thus, the common phenotype of the mucoid variants, which included a genetically engineered *mucA22* mutant, suggested that the only mutation incurred as a result of H<sub>2</sub>O<sub>2</sub> treatment was in *mucA*. When a *P. aeruginosa* biofilm was repeatedly exposed to activated PMNs in vitro, mucoid variants were also observed, mimicking in vivo observations. Thus, PMNs and their oxygen by-products may cause *P. aeruginosa* to undergo the typical adaptation to the intractable mucoid form in the CF lung. These findings indicate that gene activation in bacteria by toxic oxygen radicals, similar to that found in plants and mammalian cells, may serve as a defence mechanism for the bacteria. This suggests that mucoid conversion is a response to oxygen radical exposure and that this response is a mechanism of defence by the bacteria. This is the first report to show that PMNs and their oxygen radicals can cause this phenotypic and genotypic change which is so typical of the intractable form of *P. aeruginosa* in the CF lung. These findings may provide a basis for the development of anti-oxidant and anti-inflammatory therapy for the early stages of infection in CF patients.

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### Citation 13

#### Unique Identifier

99372777

#### Authors

Roger P. Puchelle E. Bajolet-Laudinat O. Tournier JM. Debordeaux C. Plotkowski MC. Cohen JH. Sheppard D. de Bentzmann S.

#### Institution

INSERM U514, CHR Maison Blanche, Reims, France.

#### Title

Fibronectin and alpha5beta1 integrin mediate binding of *Pseudomonas aeruginosa* to repairing airway epithelium.

#### Source

European Respiratory Journal. 13(6):1301-9, 1999 Jun.

#### Abstract

Initial infection of the airway by *Pseudomonas aeruginosa* may occur through a variety of bacterial strategies including binding to epithelial receptors present at the surface of the respiratory epithelium. In order to characterize the adherence sites for *P. aeruginosa* in damaged and repairing bronchial tissue, an ex vivo model of airway epithelial injury and repair was developed using primary cell cultures of nasal cells from 14 subjects with polyposis. *P. aeruginosa* strongly adhered to flattened dedifferentiated (FD) bronchial and nasal cytokeratin 13-positive epithelial cells in the

process of migration for repair. In in vitro experiments, competitive binding inhibition assays demonstrated that alpha5beta1 integrins and cellular fibronectin, in particular the RGD sequence, are receptors involved in *P. aeruginosa* adherence to FD nasal epithelial cells. Fluorescent cell sorting analysis and immunofluorescence techniques revealed that the alpha5beta1 integrins are overexpressed and apically exposed in FD nasal epithelial cells. One 50 kDa outer membrane protein was identified in piliated and nonpiliated strains of *P. aeruginosa* that was involved in binding to cellular fibronectin and alpha5beta1 epithelial integrins. These results demonstrate that *Pseudomonas aeruginosa* adherence is related to the dedifferentiation of airway epithelium during the repair process which unmask and upregulates the alpha5beta1 integrin expression and induces active synthesis of cellular fibronectin. These epithelial receptors are then used by a *Pseudomonas aeruginosa* 50 kDa outer membrane protein as sites of bacterial adherence.

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### Citation 14

**Unique Identifier**

99317474

**Authors**Cowell BA. Willcox MD. Herbert B. Schneider RP.**Institution**

Cooperative Research Centre for Eye Research and Technology, University of New South Wales, Australia.

**Title**Effect of nutrient limitation on adhesion characteristics of *Pseudomonas aeruginosa*.**Source**

Journal of Applied Microbiology. 86(6):944-54, 1999 Jun.

**Abstract**

*Pseudomonas aeruginosa* causes a variety of diseases in humans including lung and ocular infections. Infections of the cornea are usually associated with wearing contact lenses and can result in loss of vision. This study aimed to determine the effect of carbon or nitrogen limitation on the adhesion to contact lenses of a strain of *Ps. aeruginosa* isolated from contact lens-related corneal inflammation. Cells were grown in a continuous culture apparatus in varying levels of glucose or ammonia to effect nutrient limitation. Adhesion to contact lenses was measured as total counts and viable counts. The cell surface hydrophobicity and charge were measured using adhesion to surface-modified Sepharose. Changes in lipopolysaccharide were determined using 1D SDS-PAGE and changes in cell-surface proteins were measured using 2D gel electrophoresis. The more the cultures were nitrogen limited, the greater the increase in adhesion to unworn hydrogel contact lenses  $0.3 \times 10^3$  -  $2.2 \times 10^3$  cells/mm<sup>2</sup> on Etafilon A lenses. Cells that were carbon limited showed a greater increase in adhesion to contact lenses when the lenses had been coated in artificial tears. It appeared that lipopolysaccharide may have been involved in the constitutive adhesion to unworn lenses that occurred during C-limitation, whereas changes in the outer membrane proteins contributed to the increased adhesion under nitrogen limitation, or the change in adhesion that occurred to carbon-limited cells using contact lenses coated in artificial tears. Nine cell-surface proteins appeared during nitrogen limitation with kDa/pI of 75/4.8, 4.9, 5.0; 62/5.6; 89/6.5; 38/6.4; 28/1.5; 18/6.4; 12/4.5. Any or all of these may have been involved in the increased adhesion and further experiments are underway to examine this possibility.



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### Citation 15

**Unique Identifier**

99346578

**Authors**Lesne-Hulin A. Bourget P. Le Bever H. Carsin H.**Institution**

Service de Pharmacie Clinique, G.H. Necker-Enfants Malades, Paris, France.

**Title**[Pharmacokinetics of fusidic acid in patients with seriously infected burns].  
[French]**Source**

Pathologie Biologie. 47(5):486-90, 1999 May.

**Abstract**

The pharmacokinetics of fusidic acid (FA) were studied in 10 infected severe burns patients (35 +/- 5 yrs, 81 +/- 17 kg) i.e. 43 +/- 10% in 3rd degree. Treatment was given at the dose of 500 mg/8 hours (2-hour infusion). The kinetics of FA were evaluated on D1 (1st infusion) and at steady state on D4 (10th infusion), each sequence involving 9 whole blood samples. Samples were assayed by high-performance liquid chromatography. Data were analysed by a non-compartmental method. Mean duration of treatment, considered effective in all cases, was 5.9 +/- 2.1 days. The systemic safety of FA was felt to be good. Kinetic analysis revealed the existence of significant differences between D1 and D4 concerning the parameters Cmax, Cmin, AUC, Cl and Vss. These events are attributable to the non-linear nature of the human kinetics of FA. Accumulation ratios R1 and R2 did not differ i.e. 1.51 +/- 0.25 and R2 = 2.44 +/- 0.68. Kinetic modelling based upon the experimental tracing obtained on D1 revealed good coincidence of the predictive tracing in relation to data determined on D4. The dosage algorithm of 500 mg/8 hours was microbiologically satisfactory with Cmin measured on D1 and at steady state constantly greater than the MIC of the main organisms concerned (< to 2 micrograms/ml). Reduction in the parameters Cmax and AUC in comparison with a group of healthy subjects ultimately led to shortening of the mean T1/2 of FA. In the absence of impaired liver function, this is attributable to the known increase in hepatic clearances in burns patients and, to a certain extent, to the existence of translesional extra-hepatic clearance, which could contribute to the success of treatment.

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### Citation 16

**Unique Identifier**

99269214

**Authors**DeWitt RC. Wu Y. Renegar KB. Kudsk KA.**Institution**Department of Surgery, University of Tennessee, Memphis, Tennessee, 38163,  
USA.

**Title**

Glutamine-enriched total parenteral nutrition preserves respiratory immunity and improves survival to a **Pseudomonas** Pneumonia.

**Source**

Journal of Surgical Research. 84(1):13-8, 1999 Jun 1.

**Abstract**

**BACKGROUND:** Addition of 2% glutamine (GLN), a specific lymphocyte fuel, prevents deleterious effects of TPN on gut-associated lymphoid tissue and IgA while preserving IgA-mediated upper respiratory immunity to influenza virus. We examined whether a 2% GLN-enhanced TPN solution preserves respiratory immunity to a lethal and clinically relevant pneumonia challenge. **MATERIALS AND METHODS:** Male ICR mice were randomized to chow (n = 20), TPN (n = 20), or an isonitrogenous, isocaloric TPN-2% GLN solution (n = 17). All groups were immunized 10 days before surgery with **Pseudomonas** polysaccharide-containing liposomes (LIP) to confer immunity except for a nonimmune chow-fed LIP control group (n = 21) which received LIP without **Pseudomonas**. Mice received 5 days of diet and then were given an LD90 dose of  $1.2 \times 10^8$  intratracheal **Pseudomonas** bacteria, and mortality was recorded. **RESULTS:** Immunization reduced mortality compared with LIP alone. TPN impaired immunity and reduced survival while GLN maintained immunization effectiveness. **CONCLUSIONS:** **Pseudomonas** immunization reduces mortality to **Pseudomonas** pneumonia, but this immunity is lost with TPN. Addition of 2% GLN to TPN preserves immunity in the respiratory tract and reduces mortality to a lethal bacterial challenge compared with standard TPN. Copyright 1999 Academic Press.

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**Citation 17****Unique Identifier**

99313183

**Authors**

Simpson AJ. Maxwell AI. Govan JR. Haslett C. Sallenavé JM.

**Institution**

Rayne Laboratory, University of Edinburgh Medical School, UK.

**Title**

Elafin (elastase-specific inhibitor) has anti-microbial activity against gram-positive and gram-negative respiratory pathogens.

**Source**

FEBS Letters. 452(3):309-13, 1999 Jun 11.

**Abstract**

Elafin (elastase-specific inhibitor) is a low molecular weight inhibitor of neutrophil elastase which is secreted in the lung. Using synthetic peptides corresponding to full-length elafin (H2N-1AVT.....95Q-OH), the NH2-terminal domain (H2N-1AVT.....50K-OH) and the COOH-terminal domain (H2N-51PGS.....95Q-OH), we demonstrate that elafin's anti-elastase activity resides exclusively in the COOH-terminus. Several characteristics of elafin suggest potential anti-microbial activity. The anti-microbial activity of elafin, and of its two structural domains, was tested against the respiratory pathogens **Pseudomonas aeruginosa** and *Staphylococcus aureus*. Elafin killed both bacteria efficiently, with 93% killing of *P. aeruginosa* by 2.5 microM elafin and 48% killing of *S. aureus* by 25 microM elafin. For both organisms, full-length elafin was required to optimise bacterial killing. These findings represent the first demonstration of co-existent

anti-proteolytic and anti-microbial functions for elafin.

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### Citation 18

**Unique Identifier**

99246347

**Authors**

[Bryan R.](#) [Feldman M.](#) [Jawetz SC.](#) [Rajan S.](#) [DiMango E.](#) [Tang HB.](#) [Scheffler L.](#) [Speert DP.](#) [Prince A.](#)

**Institution**

Department of Pediatrics and Medicine, College of Physicians and Surgeons,  
Columbia University, New York, NY 10032, USA. [rab@columbia.edu](mailto:rab@columbia.edu)

**Title**

The effects of aerosolized dextran in a mouse model of  
**Pseudomonas aeruginosa** pulmonary infection.

**Source**

Journal of Infectious Diseases. 179(6):1449-58, 1999 Jun.

**Abstract**

Airway **infections** initiated by the interaction of bacterial adhesins with carbohydrate receptors can be potentially prevented by nontoxic carbohydrate inhibitors. Intranasal inoculation of neonatal mice with **Pseudomonas aeruginosa** PAO1 caused pneumonia in 55% of control mice but in only 13% of mice inoculated 2 h after dextran inhalation ( $P<.001$ ) and in 28% inoculated 4 h after dextran inhalation ( $P=.02$ ). PAO1 adherence to epithelial cells was inhibited by 50% in the presence of dextran. Dextran was well distributed throughout the airways and stimulated tumor necrosis factor- $\alpha$  production in murine lungs but not interleukin-8 production by human epithelial cell lines. Phagocytosis of PAO1 was not affected by dextran nor was killing by human neutrophils diminished. Administration of dextran by aerosol may prevent murine pneumonia by impeding bacterial access to epithelial receptors and by stimulation of the immune functions of the epithelium.

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### Citation 19

**Unique Identifier**

99269263

**Authors**

[Costerton JW.](#) [Stewart PS.](#) [Greenberg EP.](#)

**Institution**

Center for Biofilm Engineering, Montana State University, Bozeman, MT 59717,  
USA.

**Title**

Bacterial biofilms: a common cause of persistent **infections**.  
[Review] [33 refs]

**Source**

Science. 284(5418):1318-22, 1999 May 21.

**Abstract**

Bacteria that attach to surfaces aggregate in a hydrated polymeric matrix of their own synthesis to form biofilms. Formation of these sessile communities and their inherent resistance to antimicrobial agents are at the root of many persistent and chronic bacterial **infections**. Studies of biofilms have revealed differentiated, structured groups of cells with community properties. Recent advances in our understanding of the genetic and molecular basis of bacterial community behavior point to therapeutic targets that may provide a means for the control of biofilm **infections**. [References: 33]

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## Citation 20

### Unique Identifier

99277997

### Authors

[Carmeli Y.](#) [Troillet N.](#) [Eliopoulos GM.](#) [Samore MH.](#)

### Institution

Division of Infectious Diseases, Beth Israel Deaconess Medical Center, and  
Harvard Medical School, Boston, Massachusetts, USA. [ycarmeli@mailexcite.com](mailto:ycarmeli@mailexcite.com)

### Title

Emergence of antibiotic-resistant **Pseudomonas aeruginosa**:  
comparison of risks associated with different  
**antipseudomonal** agents.

### Source

Antimicrobial Agents & Chemotherapy. 43(6):1379-82, 1999 Jun.

### Abstract

**Pseudomonas aeruginosa** is a leading cause of nosocomial **infections**. The risk of emergence of antibiotic resistance may vary with different antibiotic treatments. To compare the risks of emergence of resistance associated with four **antipseudomonal** agents, ciprofloxacin, ceftazidime, imipenem, and piperacillin, we conducted a cohort study, assessing relative risks for emergence of resistant *P. aeruginosa* in patients treated with any of these drugs. A total of 271 patients (followed for 3,810 days) with **infections** due to *P. aeruginosa* were treated with the study agents. Resistance emerged in 28 patients (10.2%). Adjusted hazard ratios for the emergence of resistance were as follows: ceftazidime, 0.7 ( $P = 0.4$ ); ciprofloxacin, 0.8 ( $P = 0.6$ ); imipenem, 2.8 ( $P = 0.02$ ); and piperacillin, 1.7 ( $P = 0.3$ ). Hazard ratios for emergence of resistance to each individual agent associated with treatment with the same agent were as follows: ceftazidime, 0.8 ( $P = 0.7$ ); ciprofloxacin, 9.2 ( $P = 0.04$ ); imipenem, 44 ( $P = 0.001$ ); and piperacillin, 5.2 ( $P = 0.01$ ). We concluded that there were evident differences among antibiotics in the likelihood that their use would allow emergence of resistance in *P. aeruginosa*. Ceftazidime was associated with the lowest risk, and imipenem had the highest risk.



# **EXHIBIT 14**

Strains of *Pseudomonas stutzeri* developed stable resistance to chlorhexidine diacetate (CHA) or cetylpyridinium chloride (CPC) when exposed to gradually increasing concentrations of either antibacterial agent. Such strains showed reduced sensitivity to other non-antibiotics, including triclosan, and to some antibiotics, although this varied from strain to strain. Resistant strains were inactivated less readily by CHA or CPC and were less sensitive to sodium dodecyl sulphate. Some CHA-resistant and some CPC-resistant strains were more hydrophobic than the parent strains. Alterations in the cell envelope are likely to be responsible for non-specific changes in sensitivity to several antibacterial agents. Attempts to transfer CHA or CPC resistance by conjugation were unsuccessful. DNA from some CHA- or CPC-resistant strains could transform *Ps. stutzeri* strain JM 302, a histidine auxotroph, to prototrophy.

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#### Citation 4

##### Unique Identifier

99333357

##### Authors

[Conroy BP.](#) [Anglen JO.](#) [Simpson WA.](#) [Christensen G.](#) [Phaup G.](#) [Yeager R.](#) [Gainor BJ.](#)

##### Institution

Department of Orthopaedic Surgery, The University of Missouri-Columbia, USA.

##### Title

Comparison of castile soap, benzalkonium chloride, and bacitracin as irrigation solutions for complex contaminated orthopaedic wounds.

##### Source

Journal of Orthopaedic Trauma. 13(5):332-7, 1999 Jun-Jul.

##### Abstract

**OBJECTIVE:** The purpose of the present study was to determine the effects of cleaning a contaminated orthopaedic wound with different classes of wound irrigation solutions. **STUDY DESIGN:** Rats with a contaminated orthopaedic wound were randomized into treatment groups: normal saline (NS), castile soap (CS), benzalkonium chloride (BzC), bacitracin (Abx), or sequential irrigation with BzC, CS, and NS. **INTERVENTION:** *Pseudomonas aeruginosa* [*P. aeruginosa*;  $1 \times 10(6)$  colony-forming units (CFU)], or *Staphylococcus aureus* (*S. aureus*;  $1 \times 10(6)$  CFU) were placed into a paravertebral wound (containing a wire implant placed through a spinous process) and allowed to incubate for fifteen minutes. The wound was then irrigated with three liters of either NS, 0.05 percent CS, 0.03 percent BzC, Abx (33,000 units per liter) or underwent a sequential irrigation treatment (one liter each of BzC, CS, NS). **MAIN OUTCOME MEASUREMENTS:** The animals were observed daily for wound complications for fourteen days and then killed, and cultures of the wound were obtained. **RESULTS:** *Pseudomonas aeruginosa*: Both CS and the sequential irrigation treatment significantly lowered the rate of positive wound cultures when compared with NS ( $p < 0.05$ ). Irrigation with BzC resulted in a higher rate of positive wound cultures and complications. The sequential irrigation treatment prevented the wound complications associated with irrigation with BzC alone. *Staphylococcus aureus*: Only BzC irrigation significantly lowered the rate of positive wound cultures when compared with NS ( $p < 0.05$ ). **CONCLUSION:** The rate of positive wound cultures due to *P. aeruginosa* is effectively reduced by irrigation with CS alone or by the sequential irrigation treatment. When used alone, the antiseptic BzC results in a higher rate of positive wound cultures and wound complications. The wound complications seen with irrigation with BzC alone are prevented by the sequential irrigation treatment (BzC followed by CS and NS).



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Citations available: 25  
Citations displayed: 1-25

Chlorine dioxide

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### Citation 1

**Unique Identifier**

86240364

**Authors**

Kenyon AJ. Hamilton SG. Douglas DM.

**Title**

Comparison of antipseudomonad activity of chlorine dioxide/chlorous acid-containing gel with commercially available **antiseptics**.

**Source**

American Journal of Veterinary Research. 47(5):1101-4, 1986 May.

**Abstract**

A chlorine dioxide-containing gel was compared with 3 commercially available antimicrobials and 1 antibiotic intended for topical use. This gel was tested at 0.5 X and 4 X and was found to be more effective as a 4 X gel in treating **Pseudomonas aeruginosa**-infected excised wounds on mice. To further compare this gel with other **antiseptics**, a murine bioassay was developed. This wound model consisted of an excised cutaneous wound on the dorsum of mice which were irradiated (800 rad) and inoculated with **P aeruginosa** at 10-fold dilutions, from 10(-2) to 10(-10). The wounds were observed for latency of infection or mice survival time as a function of concentration of viable organisms remaining after treatment. The advantage of this model was demonstrated where a standard curve based on latency did not consume as many test subjects and yet provided an estimate of viable organisms in each wound. In this model, the chlorine dioxide-containing gel was more active than were preparations of providone-iodine, chlorhexidene, or silver sulfadiazine and was similar to polymyxin-bacitracin-neomycin ointment as a topical **antiseptic**. The effectiveness of the tested gel was reduced if delays in treatment were longer than 1 hour.

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### Citation 2

Cetyltrimethyl Ammonium  
bromide (CTAB)

**Unique Identifier**

86154437

**Authors**

Wolfel L. Mach F. Chattopadhyay SP.

**Title**

[Comparative cytologic studies on the effect of cetyltrimethylammonium bromide on bacterial cells]. [German]

**Source**

Zentralblatt fur Mikrobiologie. 140(8):631-9, 1985.

**Abstract**

Growing cultures of *Pseudomonas aeruginosa* and *Bacillus megaterium* show after treatment with cetyltrimethylammonium bromide (CTAB) typical concentration-dependent alterations of envelope. In *Ps. aeruginosa* low doses of the detergent cause perforations and lesions of the cytoplasmic membrane, by 0.016% CTAB the formation of extracellular vesicles of the outer membrane ("blebs") and the intracellular assembly of lamellar structures can be detected. These intracellular lamellar structures are artifacts of the cytoplasmic membrane after detergent application. In this case the conglomeration of bacterial cells can be demonstrated with the scanning electron microscope. The results are discussed in connection with the use of CTAB in inactivation and permeabilization of bacteria.

---

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**Citation 3****Unique Identifier**

85301747

**Authors**Tsarev NI. Petrik EV. Aleksandrova VI.**Title**

[Use of propolis in the treatment of **local** suppurative infection]. [Russian]

**Source**

Vestnik Khirurgii Imeni i - i - Grekova. 134(5):119-22, 1985 May.

**Abstract**

Experience with the treatment of 460 patients with panaritium, abscesses, phlegmons, infectious wounds have shown that propolis is an expedient remedy (in addition to the the routine treatment). They have shown the stimulating, antiinflammatory and anti-microbial action of propolis.

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**Citation 4****Unique Identifier**

85305646

**Authors**Cotter JL. Fader RC. Lilley C. Herndon DN.**Title**

Chemical parameters, antimicrobial activities, and tissue toxicity of 0.1 and 0.5% sodium hypochlorite solutions.

**Source**

Antimicrobial Agents &amp; Chemotherapy. 28(1):118-22, 1985 Jul.

**Abstract**

ffe chemical parameters, antimicrobial activity, and tissue toxicity of two sodium hypochlorite (NaOCl) solutions buffered to a physiologic pH were studied. Initially, a 0.5% NaOCl solution buffered with 3 g of NaH<sub>2</sub>PO<sub>4</sub> per liter was examined. The solution had a pH of 7.49 and an osmolality of 352 mOsmol/liter. When compared with unbuffered and NaHCO<sub>3</sub>-buffered 0.5%

NaOCl : Sodium hypochlorite  
(but needs to be fresh)



NaOCl solutions, the NaH<sub>2</sub>PO<sub>4</sub>-buffered solution was significantly more effective in killing *Staphylococcus aureus* in vitro. However, the pH of the NaH<sub>2</sub>PO<sub>4</sub>-buffered solution decreased over time with a concomitant decrease in antibacterial activity. A freshly prepared solution decontaminated human cadaveric skin colonized by *S. aureus*, ***Pseudomonas aeruginosa***, or *Candida albicans* in vitro within 10 min of exposure, whereas a 24-h-old solution cleared the skin of organisms within 15 min. When gauze soaked with 0.5% NaOCl was applied to guinea pig skin for 2 weeks, a 15% decrease in basal cell viabilities was noted. Because of the pH instability and basal cell toxicity, a 0.1% NaOCl solution buffered with NaH<sub>2</sub>PO<sub>4</sub>-Na<sub>2</sub>HPO<sub>4</sub> was evaluated. This solution had an osmolality of 386 mOsmol/liter and a pH of 7.4 that was stable over 1 week. A freshly prepared 0.1% NaOCl solution decontaminated skin colonized with *S. aureus*, *C. albicans*, and ***P. aeruginosa*** within 10, 20, and 30 min, respectively. A 24-h-old solution did not completely decontaminate the colonized skin but significantly reduced the number of microorganisms on the skin surface (P less than 0.001). Application of this solution of guinea pig skin for 2 weeks produced no significant effect on basal cell viabilities. These solutions may serve as alternative topical agents for use in burn therapy.

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### Citation 5

#### Unique Identifier

85117737

#### Authors

[el-Nima EI.](#)

#### Title

The synergism between cetrimide and antibiotics against ***Pseudomonas aeruginosa***.

#### Source

Zentralblatt für Bakteriologie, Mikrobiologie, und Hygiene - Series A, Medical Microbiology, Infectious Diseases, Virology, Parasitology. 258(1):120-7, 1984 Oct.

#### Abstract

Forty eight clinical isolates of ***P. aeruginosa*** were tested for susceptibility to seven different antimicrobial agents. When tested on Mueller-Hinton agar, the isolates were found to be resistant to ampicillin, sensitive to the antipseudomonal antibiotics, polymyxin B, gentamicin and carbenicillin. Polymyxin B inhibited all the isolates, whereas both carbenicillin and gentamicin inhibited 92.1% of the isolates. Neomycin, sulphamethoxypyridazine and chlortetracycline showed moderate activity and inhibited 50%, 28.9% and 15.8% of the isolates, respectively. However, on Mueller-Hinton agar supplemented with 0.03% cetrimide, the isolates succumbed readily to antimicrobial agents. In addition to polymyxin B, gentamicin and carbenicillin, all the strains were inhibited by neomycin and 94.7%, 92.1% and 63.6% of the isolates were inhibited by sulphamethoxypyridazine, chlortetracycline and ampicillin, respectively. Cetrimide, in concentrations ranging from 0.01 to 0.04% decreased the MIC of ampicillin against all the isolates, whereas 0.1% and 0.5% polysorbate 80 (tween 80) had no effect on the MIC. Growth inhibition studies have shown that the number of survivors was greatly reduced in presence of cetrimide and ampicillin. There was also an appreciable increase in the uptake of ampicillin by the bacterial cells in the presence of cetrimide.

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### Citation 6

**Unique Identifier**

85029686

**Authors**

[Gilmore DS.](#) [Montgomerie JZ.](#) [Graham IE.](#) [Schick DG.](#) [Jimenez EM.](#)

**Title**

Effect of **antiseptic** agents on skin flora of the perineum of men with spinal cord injury.

**Source**

Infection Control. 5(9):431-4, 1984 Sep.

**Abstract**

Male patients with spinal cord injury are frequently colonized with *P. aeruginosa* and *K. pneumoniae* on the perineum. Regular bathing with bar soap has not influenced this colonization. We have attempted to remove these bacteria using **antiseptic** agents. The number of *P. aeruginosa*, *K. pneumoniae* and total aerobic bacteria on the perineum and the penile shaft was determined before and after cleaning with bar soap, chlorhexidine, povidone-iodine and pHresh. Povidone-iodine and chlorhexidine had no advantage over bar soap or pHresh in the removal of *P. aeruginosa* or *K. pneumoniae* from the perineum of patients with spinal cord injury.

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### Citation 7

**Unique Identifier**

85029685

**Authors**

[Barry MA.](#) [Craven DE.](#) [Goularte TA.](#) [Lichtenberg DA.](#)

**Title**

*Serratia marcescens* contamination of **antiseptic** soap containing triclosan: implications for nosocomial infection.

**Source**

Infection Control. 5(9):427-30, 1984 Sep.

**Abstract**

During a recent investigation in our surgical intensive care unit, we found that several bottles of the **antiseptic** handwashing soap, OR Scrub, were contaminated with *Serratia marcescens*. OR Scrub contains 1% triclosan, lanolin, and detergents. The antimicrobial efficacy of OR Scrub was examined in vitro using serial two-fold dilutions of soap inoculated with various concentrations of different nosocomial pathogens. The minimal bactericidal concentration (MBC) of OR Scrub against *Pseudomonas aeruginosa* and several strains of *S. marcescens* was less than or equal to 1:2. By comparison, a non-**antiseptic** soap from the same manufacturer (Wash) and 4% chlorhexidine (Hibiclens) had MBCs for all strains tested of at least 1:64. Time-kill curves confirmed the findings of the initial experiments. This is the first report of extrinsic contamination of **antiseptic** soap containing triclosan. No **infections** could be attributed to the contaminated soap, but sporadic outbreaks of *Serratia* have occurred in the intensive care unit with no identifiable source. Although there have been few studies on the impact of **antiseptic** soap in reducing nosocomial infection, we

question whether a soap with the limitations of OR Scrub should be used in intensive care units or operating rooms.

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Citation 8

methenamine mandelate

Unique Identifier

84269269

Authors

[Kevorkian CG.](#) [Merritt JL.](#) [Ilstrup DM.](#)

Title

Methenamine mandelate with acidification: an effective urinary antiseptic in patients with neurogenic bladder.

Source

Mayo Clinic Proceedings. 59(8):523-9, 1984 Aug.

Abstract

We studied the effectiveness of methenamine mandelate in preventing urinary tract infection in patients with neurogenic bladder dysfunction who were in a program of intermittent catheterization and bladder retraining. Nine of 17 patients (53%) became infected while receiving the drug, whereas 19 of 22 patients (86%) in a placebo group became infected during the trial. The difference in infection rates was statistically significant (P less than 0.02) and resulted primarily from the absence of gram-positive cocci and *Pseudomonas* species in the drug group.

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Citation 9

Chlorhexidine diphosphanilate

Unique Identifier

84127320

Authors

[McManus AT.](#) [Denton CL.](#) [Mason AD Jr.](#)

Title

Topical chlorhexidine diphosphanilate (WP-973) in burn wound sepsis.

Source

Archives of Surgery. 119(2):206-11, 1984 Feb.

Abstract

We studied the diphosphanilate salt of chlorhexidine (WP-973), as a 2% cream, for therapeutic activity in two rat models of fatal burn wound infection. Control treatments were infection and placebo cream; infection only; infection and 1% sulfadiazine silver; and burning only. Activity against *Pseudomonas aeruginosa* or *Proteus mirabilis* was tested in surface-inoculated rats with 20% scalds. Treatments were initiated 24 hours or four hours, respectively, after inoculation. *Pseudomonas*-infected rats were treated once a day for ten days. *Proteus*-infected rats were treated once a day for five days. In these experimental models, chlorhexidine diphosphanilate was equal to silver sulfadiazine, an established topical chemotherapeutic agent. In vitro activity was examined using bacteremia isolates from 65 burned patients. Using agar diffusion trench plates, chlorhexidine diphosphanilate was active against all strains. No evidence of cross-resistance between sulfonamide

and chlorhexidine diphosphanilate or its components was observed.

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### Citation 10

**Unique Identifier**

81231655

**Authors**

Finzi G. Grimaldi G.

**Title**

[Comparative study of the activity of several disinfectants against bacterial strains isolated in a hospital environment and of laboratory origin].  
[Italian]

**Source**

Archivio Per Le Scienze Mediche. 137(4):749-62, 1980 Oct-Dec.

**Abstract**

The activity of 7 active principles contained in several disinfectant solutions in various percentages, and in water and in alcohol, against 15 bacteria strains (9 of hospital origin and 6 cultured in the laboratory) was examined, using modified version of the contact test (employment of hospital strains, fixed high-level) charges of microbes, and short **antiseptic**-bacterium contact times).

---

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### Citation 11

**Unique Identifier**

81093140

**Authors**

Stamm WE. Arbaczawski J. Mackel DC. Anderson RL.

**Title**

Susceptibility of nosocomial urinary tract **infections** caused by multiply resistant gram-negative bacilli: potential use of antimicrobials "resistant" by disc-diffusion testing for controlling epidemics.

**Source**

Infection Control. 1(3):157-64, 1980 May-Jun.

**Abstract**

Protracted hospital-based epidemics of urinary tract infection and bacteremia due to multiply resistant gram-negative bacilli have become an increasingly common and serious problem. Failure to control such outbreaks stems partly from inability to eradicate a key reservoir, the catheterized bladder. Since eradication of bacteriuria in noncatheterized patients can be achieved with single doses of antimicrobials and correlates with urinary rather than with serum antibiotic concentrations, drugs to which an organism appears resistant by disc-diffusion testing, if excreted in the urine in high concentrations, might also prove useful in eliminating catheter-associated bacteriuria. Alternatively, urinary **antiseptics**, for which antimicrobial sensitivity testing is not usually done, might be effective. To test this hypothesis we determined the minimum inhibitory concentrations (MICs) of 45 multiply resistant *Proteus*, *Serratia*, *Klebsiella*, and *Pseudomonas* strains isolated in 13 recent epidemics of

nosocomial urinary tract **infections** against 10 selected antimicrobials and urinary **antiseptics**, and compared these MICs with expected urinary concentrations of each drug. For each genus tested, MICs for at least two antimicrobials or urinary **antiseptics** were well below easily achievable urinary drug concentrations. Zone size criteria often predicted which drugs had MICs below achievable urinary levels. Little difference was found between MICs determined in Mueller-Hinton broth and in urine. During an epidemic; simultaneous treatment of all patients with bacteriuria by administration of a urinary **antiseptic** or an antibiotic that achieves high concentrations in urine, in conjunction with brief catheter removal, might prove useful in controlling any further infection.

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## Citation 12

### Unique Identifier

81045054

### Authors

Krynski S. Becla E.

### Title

[Studies of bacterial flora in newborn infants delivered in the Gdansk and Elblag districts, conducted periodically over a year. II. Sensitivity of *Staphylococcus aureus*, *Klebsiella* and *Pseudomonas aeruginosa* to antibiotics and biseptol]. [Polish]

### Source

Ginekologia Polska. 51(8):699-703, 1980 Aug.

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### Unique Identifier

80204810

### Authors

Stickler DJ. Thomas B.

### Title

**Antiseptic** and antibiotic resistance in Gram-negative bacteria causing urinary tract infection.

### Source

Journal of Clinical Pathology. 33(3):288-96, 1980 Mar.

### Abstract

A collection of 802 isolates of Gram-negative bacteria causing urinary tract **infections** was made from general practice, antenatal clinics, and local hospitals. The organisms were tested for their sensitivity to chlorhexidine, cetrимide, glutaraldehyde, phenyl mercuric nitrate, a phenolic formulation, and a proprietary **antiseptic** containing a mixture of picloxydine, octyl phenoxy polyethoxyethanol, and benzalkonium chloride. *Escherichia coli*, the major species isolated, proved to be uniformly sensitive to these agents. Approximately 10% of the total number of isolates, however, exhibited a degree of resistance to the cationic agents. These resistant organisms were members of the genera *Proteus*, *Providencia*, and *Pseudomonas*; they were also generally resistant

10% of *P. aerug.*  
are resist. to these

Citation 13

Chlorhexidine  
cetrимide  
glutaraldehyde  
phenyl mercuric nitrate  
mixture with picloxydine  
octyl phenoxy polyethoxyethanol  
benzalkonium chloride

to five, six, or seven antibiotics. It is proposed therefore that an **antiseptic** policy which involves the intensive use of cationic **antiseptics** might lead to the selection of a flora of notoriously drug-resistant species.

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#### Citation 14

##### Unique Identifier

80121584

##### Authors

Thomas PA. Bhat KS. Kotian KM.

##### Title

Antibacterial properties of dilute formocresol and eugenol and propylene glycol.

##### Source

Oral Surgery, Oral Medicine, Oral Pathology. 49(2):166-70, 1980 Feb.

##### Abstract

Formocresol and eugenol are the two nonspecific intracanal medicaments commonly used in endodontic practice. Both have high tissue irritation potential when used in conventional strength. Propylene glycol is an alcohol that is injectable and itself possesses significant antibacterial action. It is a popular vehicle and hence was used to modify the two drugs. Standard bacteriologic methods were employed to test the antibacterial action of these lower concentrations of the two drugs against four test organisms. The investigations indicate that formocresol at as low as 10 to 20% and eugenol at 75% are bactericidal in action and hence may be useful at these concentrations for clinical use. Evaluation of these lower concentrations is warranted for possible clinical use. Propylene glycol, which possesses antibacterial action and is remarkably innocuous to tissues, appears to be a suitable vehicle for dilution of formocresol and eugenol.

- Formocresol } +  
- eugenol } @  
propylene  
glycol  
(alcohol)

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#### Citation 15

##### Unique Identifier

80038341

##### Authors

Litovchenko PP.

##### Title

[Ultrastructural changes in the cells of a nonsynchronous *Pseudomonas aeruginosa* culture occurring under the influence of chlorhexidine bigluconate]. [Russian]

##### Source

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii. (8):83-6, 1979 Aug.

##### Abstract

Total preparations of *P. aeruginosa* (strain 65) were studied after contrastive treatment with 2% phosphato-tungstic acid and 2% uranyl acetate; ultrathin sections of bacteria treated with chlorhexidine bigluconate in various concentrations and fixed by the method of Hoffmann et al.

2% phosphato-tungstic acid  
2% uranyl acetate

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### Citation 23

**Unique Identifier**

77032021

**Authors**[Frank MJ.](#) [Schaffner W.](#)**Title**

Contaminated aqueous benzalkonium chloride. An unnecessary hospital infection hazard.

**Source**

JAMA. 236(21):2418-9, 1976 Nov 22.

**Abstract**

During January and February 1975, nine patients on a single ward of a rural Tennessee hospital unexpectedly developed sepsis. The aseptic technique employed in the management of intravenous infusions was implicated. *Pseudomonas cepacia* was recovered from the following: bloodstream, inuse intravenous infusions and the **antiseptic**, aqueous benzalkonium chloride. The outbreak again calls attention to the infection risk associated with the use of this product. Selection of less hazardous **antiseptics** and disinfectants is strongly recommended.

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### Citation 24

**Unique Identifier**

76246748

**Authors**[Delmotte A.](#) [Beumer J.](#)**Title**

[The sensitivity of *Pseudomonas aeruginosa* (pyocyanic bacillus) to **antiseptics** and antibiotics. IX. Effect of culture media on the antiseptogram]. [French]

**Source**

Therapie. 31(2):257-65, 1976 Mar-Apr.

---

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### Citation 25

**Unique Identifier**

76095993

**Authors**[Ojajarvi J.](#)**Title**

An evaluation of **antiseptics** used for hand disinfection in wards.

3% hexachlorophane  
2% Irgasan CF<sub>3</sub>R  
4% Chlorhexidine

**Source**

Journal of Hygiene. 76(1):75-82, 1976 Feb.

**Abstract**

The antibacterial effectiveness of hand **antiseptics** commonly used in wards was studied by laboratory and in-use tests and their acceptability assessed by means of a questionnaire passed to hospital staff. To determine the immediate and long-term antibacterial effects of the preparations the in-use tests were performed by groups of students. The greatest immediate reduction in bacterial counts on hands was obtained by products containing chlorhexidine. The long-term antibacterial effect was recorded with emulsions containing 3% hexachlorophane, 2% Irgasan CF3R or 4% chlorhexidine when used constantly on several consecutive days. Considerable discrepancies were recorded in the antibacterial effectiveness of some preparations when comparing laboratory and in-use test results. Therefore it is suggested that **antiseptics** should be tested by in-use tests which more closely resemble practical conditions before their use, or further trial, in hospital.





EDTA

**Unique Identifier**

77212015

**Authors**Caplin H. Chapman DC.**Title**

A comparison of three commercially available **antiseptics** against opportunist gram-negative pathogens.

**Source**

Microbios. 16(64):133-8, 1976.

**Abstract**

Two test methods, a skin replica test and the Kelsey Sykes test have been used to compare the efficacy of three **antiseptics** against three Gram-negative micro-organisms in an attempt to select the most suitable. The results of both tests showed that an **antiseptic** containing added ethylenediaminetetraacetic acid was superior to the other two. The skin test showed that this superiority was apparent in both the immediate and the persistent bactericidal activity of the **antiseptic** towards all three Gram-negative micro-organisms.

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**Citation 21****Unique Identifier**

77107050

**Authors**Meyer-Rohn J.**Title**

[Effective agents against **Pseudomonas pyocyanea** (proceedings)]. [German]

**Source**

Zeitschrift fur Hautkrankheiten. 51 Suppl 2:106-8, 1976.

---

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**Citation 22****Unique Identifier**

77032031

**Authors**Hussey HH.**Title**

Benzalkonium chloride: failures as an **antiseptic** [editorial].

**Source**

JAMA. 236(21):2433, 1976 Nov 22.

were also studied with the use of an electron microscope IEM 100 v. Structural and morphological changes depending on the concentration and the time of action of the **antiseptic** were discovered; these changes were manifested by bacterial lysis and coagulation, the lossening of the cell wall with revealing its five-layer structure.

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Citation 16

Unique Identifier

79132011

Authors

Brown MR. Tomlinson E.

Title

Sensitivity of **Pseudomonas aeruginosa**  
envelope mutants to alkylbenzyldimethylammonium chlorides.

Source

Journal of Pharmaceutical Sciences. 68(2):146-9, 1979 Feb.

Abstract

A series of stepwise polymyxin-resistant envelope mutants of **Pseudomonas aeruginosa** was used to test the activity of a homologous series (C10-C18) of alkylbenzyldimethylammonium chlorides. A sterilization kinetics procedure in deionized water was devised to avoid amounts quaternary compound above the critical micelle concentration. In all cases, there was a linear relationship between the logarithm of the rate of change of the colony count with time and the logarithm of the homolog concentration. For all strains, there was a linear relationship between alkyl chain length and the concentration required to reduce the colony count to 10% in 2 hr. The stepwise series of polymyxin-resistant strains increased in resistance to polymyxin about threefold for each step. In general, this increase resulted in a similar increase in resistance to the quaternary compound. It is proposed that death in this system may primarily be a consequence of damage to the outer membrane rather than to the cytoplasmic membrane.

alkylbenzyldimethylammonium  
chlorides

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Citation 17

Unique Identifier

79048680

Authors

Ayliffe GA. Babb JR. Quoraishi AH.

Title

A test for 'hygienic' hand disinfection.

Source

Journal of Clinical Pathology. 31(10):923-8, 1978 Oct.

Abstract

A standardised test procedure is described in which finger-tips are inoculated with broth cultures of organisms (*Staphylococcus aureus*, *Staphylococcus saprophyticus*, *Escherichia coli*, and **Pseudomonas aeruginosa**): counts are made from washings of hands after disinfection with various

70% alcohol  
+ Chlorhexidine

and a significant number of bacteria still survived after 6 hours of treatment. The results suggest that ACTICOAT Antimicrobial Barrier Dressing has better antimicrobial performance than either of the existing silver-based products. ACTICOAT dressing killed the bacteria that were tested much faster, which is a very important characteristic for a wound dressing acting as a barrier to invasive infection to have. The study also suggests that a single susceptibility test such as a MIC or zone of inhibition test does not provide a comprehensive profile of antimicrobial activity of a topical antimicrobial agent or dressing. A combination of tests is desirable.

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## Citation 7

### Unique Identifier

99231672

### Authors

Sakagami Y. Mimura M. Kajimura K. Yokoyama H. Nishimura H.

### Institution

Osaka Prefectural Institute of Public Health, Japan.  
sakagami@iph.pref.osaka.jp

### Title

Electron-microscopic study of the bactericidal effect of OPB-2045, a new mono-biguanide disinfectant produced from biguanide group compounds, against *Pseudomonas aeruginosa*.

### Source

Journal of Pharmacy & Pharmacology. 51(2):201-6, 1999 Feb.

### Abstract

The bactericidal activity of OPB-2045 (1-(3,4-dichlorobenzyl)-5-octylbiguanide monohydrochloride hemihydrate) at several concentrations against *Pseudomonas aeruginosa* IFO 13275 was investigated morphologically by transmission and scanning electron microscopy. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of OPB-2045 against *P. aeruginosa* were the same, at 12.5 microg mL(-1), suggesting that it may be a suitable disinfectant for use in the medical field. Test bacteria were treated at concentrations of one half the MIC value (6.25 microg mL(-1)), the MIC value (12.5 microg mL(-1)), twice the MIC value (25 microg mL(-1)) or ten times the MIC value (125 microg mL(-1)) at 37 degrees C for 30 min or 6 h and the cells were then examined by transmission and scanning electron microscopy. The cell damage evident after 6h incubation was greater than observed after 30 min incubation. Especially, at one half the MIC, no cell damage was evident after 30 min incubation, but damaged cells were observed after 6 h incubation. The proportion of empty cells of *P. aeruginosa* increased as the concentration of added disinfectant was increased, and the release of intracellular components was also recognized. These results suggest that OPB-2045 acts on the cell membrane and cell wall of *P. aeruginosa*, and destroys their integrity at the level of the MIC (MBC). With the increase in OPB-2045 concentration and the increase in reaction time, the bactericidal effect increased markedly. Agglutination of the cells was observed at high concentrations of OPB-2045. This indicates that the bactericidal effect at high concentrations of OPB-2045 differs from that at low concentrations. A clear cell-damaging effect against the test strain was recognized which was dependent on the OPB-2045 concentration and the incubation time. From experiments concerning the relationship between the number of surviving bacteria and MIC values in soybean casein digest broth, the decrease in bacterial numbers was found to be dependent on the OPB-2045 concentration.

We conclude that it would be a useful contribution to the medical field to supply a new disinfectant to be employed in preventive countermeasures against infection caused by pathogenic bacteria.

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### Citation 8

**Unique Identifier**

99153812

**Authors**

Aiba M. Ninomiya J. Furuya K. Arai H. Ishikawa H. Asaumi S. Takagi A. Ohwada S. Morishita Y.

**Institution**

Department of Surgery, Fujiyoshida City Hospital, Yamanashi, Japan.

**Title**

Induction of a critical elevation of povidone-iodine absorption in the treatment of a burn patient: report of a case. [Review] [10 refs]

**Source**

Surgery Today. 29(2):157-9, 1999.

**Abstract**

A critical elevation of povidone-iodine absorption which occurred in a burn patient who was topically treated with 10% povidone-iodine (PI) gel is herein reported. A 65-year-old man was admitted to our hospital for deep second- and third-degree burns covering 26% of his total body surface area. The intravenous administration with lactated Ringer's solution and topical treatment with silver sulfadiazine were applied in addition to such treatments as debridement and skin grafting. However, wound infection occurred due to **Pseudomonas aeruginosa**. Topical treatment with PI gel was effective for this condition. Persistent nodal bradycardia with hypotension, metabolic acidosis, and renal failure occurred 16 days after the start of PI gel treatment. Iodine toxicosis caused by PI gel was suspected with a serum iodine level of 20600 microg/dl (normal range 2-9 microg/dl). The PI gel treatment was therefore discontinued immediately, and hemodialysis was scheduled. However, the patient's family refused hemodialysis and he died 44 days after admission. To our knowledge, only eight patients with iodine toxicosis have been reported in burn patients treated with PI gel. [References: 10]

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### Citation 9

**Unique Identifier**

20010145

**Authors**

Tattawasart U. Maillard JY. Furr JR. Russell AD.

**Institution**

Welsh School of Pharmacy, Cardiff University, Cardiff, UK.

**Title**

Comparative responses of **Pseudomonas stutzeri** and **Pseudomonas aeruginosa** to antibacterial agents.

**Source**

Journal of Applied Microbiology. 87(3):323-31, 1999 Sep.

**Abstract**

The sensitivity of six strains of *Pseudomonas stutzeri* (NCIMB 568, 10783, 11358, 11359, JM 302, JM 375) to cationic **antiseptics**, mercury compounds, the parabens, phenolics, EDTA and various antibiotics was compared with *Pseudomonas aeruginosa* NCIMB 8626. All *Ps. stutzeri* strains were highly sensitive to chlorhexidine diacetate, organomercurials and triclosan, but rather less so to quarternary ammonium compounds (QACs). They were also sensitive to other biocidal agents and more sensitive to many antibiotics than the strain of *Ps. aeruginosa*. There was little correlation between uptake of chlorhexidine diacetate or cetylpyridinium chloride by dense suspensions of organisms, leakage of intracellular constituents and loss of cell viability.

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**Citation 10****Unique Identifier**

99412899

**Authors**

Flanagan DA. Palenik CJ. Setcos JC. Miller CH.

**Institution**

Oral and Maxillofacial Surgery Program, Indiana University School of Dentistry, Indianapolis, USA.

**Title**

Antimicrobial activities of dental impression materials.

**Source**

Dental Materials. 14(6):399-404, 1998 Nov.

**Abstract**

**OBJECTIVE:** The aim of this study was to measure the in vitro killing effects five commercial alginate impression materials had on five test microorganisms. **METHODS:** Two alginates with no added disinfectant, one supplemented with chlorhexidine and two others containing quaternary ammonium compounds were tested. Challenge microbes included two gram-positive cocci, two gram-negative bacilli and a yeast. Saline solutions containing standardized concentrations of test microbes were used to mix the alginates. Some set specimens were immediately homogenized and the resulting fluids diluted and spread plated. Other specimens were processed 30 or 60 min after setting. After culturing, the numbers of colonies were counted and the levels of microbial reductions determined. **RESULTS:** Unsupplemented alginates had no antimicrobial effects. The quaternary-ammonium-containing alginates were completely effective against all five test microorganisms. The alginate with chlorhexidine killed all the gram-negative bacilli and the majority (95-99%) of the gram-positive cocci and yeast. **SIGNIFICANCE:** Results indicated that disinfectant-containing alginate impression materials could reduce the number of soiling microorganisms present on and within test specimens.

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**Citation 11**

**Unique Identifier**

99085515

**Authors**Maillard JY. Messenger S. Veillon R.**Institution**

Welsh School of Pharmacy, University of Wales, Cardiff, UK.

**Title**

Antimicrobial efficacy of biocides tested on skin using an ex-vivo test.

**Source**

Journal of Hospital Infection. 40(4):313-23, 1998 Dec.

**Abstract**

An ex-vivo test was used to evaluate the activity of antimicrobials against three microorganisms, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. The ex-vivo test is a carrier test using freshly excised animal skin samples maintained in viable conditions for a short period of time. Skin samples came from a veterinary practice and were excised from either dogs or cats. The antimicrobial activity of povidone iodine, chlorhexidine diacetate, cetrimide and benzalkonium chloride was also evaluated with suspension and glass-carrier tests. Generally, the activity of the antimicrobials tested was reduced when applied to the skin surface. Apart from povidone iodine (2%) against *S. aureus*, the biocides investigated failed to achieve a 5 log<sub>10</sub> reduction in bacterial titre when tested with the ex-vivo method. There was no significant difference in reduction of bacterial titres after treatment with antimicrobials between the glass-carrier and the suspension tests. Furthermore, the drying process of bacterial inoculum was less detrimental on skin than on glass surfaces. This study confirmed that the activity of a biocide tested in suspension or on an inanimate surface did not reflect its activity when tested on skin. Further development of the ex-vivo test may be useful, especially for testing the antimicrobial activity of formulations with antiseptic properties.

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**Citation 12****Unique Identifier**

98421588

**Authors**Hidalgo E. Bartolome R. Barroso C. Moreno A. Dominguez C.**Institution**

Centre d'Investigacions en Bioquímica i Biologia Molecular, Universitat Autònoma de Barcelona, Espana.

**Title**

Silver nitrate: antimicrobial activity related to cytotoxicity in cultured human fibroblasts.

**Source**

Skin Pharmacology &amp; Applied Skin Physiology. 11(3):140-51, 1998 May-Jun.

**Abstract**

The aims of this study were to ascertain whether silver nitrate (AgNO<sub>3</sub>) concentrations below those used in clinical practice inhibit bacterial growth, and in parallel study the cytotoxic effects on human fibroblasts. The cytoprotective effects of fetal calf serum (FCS) were also evaluated. The cytotoxic effects of eight different silver nitrate concentrations were determined by assessing mitochondrial activity of viable cells capable of cleaving tetrazolium salts. Antimicrobial activity of AgNO<sub>3</sub>, range:

7-550 x 10(-5)%, was tested against *Staphylococcus aureus*, *Citrobacter freundii*, and *Pseudomonas aeruginosa*. Silver nitrate concentrations exerting antimicrobial effects were: *S. aureus*, >70 x 10(-5)%; *P. aeruginosa*, >=270 x 10(-5)%, and *C. freundii*, >=550 x 10(-5)%. With 2% FCS, the lowest AgNO3 concentration studied (7 x 10(-5)%) showed cytotoxic effects (cell survival 71 +/- 19%) at only 2 h of incubation. Under these conditions AgNO3 cytotoxicity was time- and concentration-dependent in all exposure periods. Cytotoxicity was greatly enhanced causing 76% fibroblast growth inhibition at concentrations of 14 x 10(-5)% and contact time of 2 h. The AgNO3 concentration of 7 x 10(-5)% was also cytotoxic with 5% FCS in the media compared with controls, although cell survival was higher than with 2% FCS. The cytoprotective action of FCS was clearly shown at the concentration of 10% at which AgNO3 cytotoxicity of 7 x 10(-5)% to 28 x 10(-5)% was partially or completely inhibited. Our results show that AgNO3 at concentrations 100-700 times more diluted than that normally used in clinical practice retained effective inhibitory activity against some of the above-mentioned microorganisms. However, even these concentrations are cytotoxic for cultured fibroblasts. Thus, silver nitrate concentrations up to 100 times more diluted can be used, since they possess bacterial growth-inhibiting power, are less cytotoxic and therefore favour wound healing.

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### Citation 13

#### Unique Identifier

98432513

#### Authors

Szita G. Tabajdi V. Fabian A. Biro G. Reichart O. Kormoczy PS.

#### Institution

Department of Food Hygiene, University of Veterinary Science, Budapest, Hungary.

#### Title

A novel, selective synthetic acetamide containing culture medium for isolating *Pseudomonas aeruginosa* from milk.

#### Source

International Journal of Food Microbiology. 43(1-2):123-7, 1998 Aug 18.

#### Abstract

A selective synthetic medium has been developed both in liquid (Z-broth) and solid (Z-agar) forms for selective isolation of *Pseudomonas aeruginosa* from foods. The simple, easy to prepare peptone-free synthetic medium contained acetamide that is metabolized to ammonia and acetic acid providing nitrogen and carbon supply. The medium contained no inhibitors. Selectivity of the liquid medium was tested by inoculation of pure cultures of different bacteria belonging to the groups *Bacillus*, *Pseudomonas*, *Enterobacteriaceae* and *Staphylococcus*. It was found that the selectivity of the medium was complete for the examined range of bacteria. However, a similar result was obtained when nitrofurantoin broth was used. Applicability of the synthetic agar medium was also tested by a nation-wide inter-laboratory test using two milk samples containing 10(3)/ml (sample I) and 10(5)/ml (sample II) *Pseudomonas aeruginosa*. According to this test, no microbiologically relevant differences were found between the results obtained by Z-agar and cetrimide-agar a frequently used selective agar in case of sample II. However, a relevant and statistically significant difference was found in the results of sample I in favour of the Z-agar, that could indicate the presence of a low number of bacteria. Concerning repeatability and reproducibility, Z-agar proved to

be superior to cetrimide agar.

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#### Citation 14

**Unique Identifier**

98422721

**Authors**

[Ayres HM.](#) [Payne DN.](#) [Furr JR.](#) [Russell AD.](#)

**Institution**

Welsh School of Pharmacy, University of Wales Cardiff, UK.

**Title**

Effect of permeabilizing agents on antibacterial activity against a simple *Pseudomonas aeruginosa* biofilm.

**Source**

Letters in Applied Microbiology. 27(2):79-82, 1998 Aug.

**Abstract**

A simple *Pseudomonas aeruginosa* G48 biofilm on stainless steel discs provided a useful primary screen of potentiating effects of various permeabilizing agents on antibacterial agents. Experiments with *Ps. aeruginosa* suspensions could not be used to predict the effects of biocides and permeabilizers on biofilms. Although antibacterial activity against biofilms was less than demonstrated in suspension tests, potentiation by some permeabilizers was still observed.

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#### Citation 15

**Unique Identifier**

98390230

**Authors**

[Dinning AJ.](#) [al-Adham IS.](#) [Austin P.](#) [Collier PJ.](#)

**Institution**

School of Molecular and Life Sciences, University of Abertay Dundee, Jordan.

**Title**

A novel assay for the distribution of pyrrithione biocides in bacterial cells.

**Source**

Letters in Applied Microbiology. 27(1):1-4, 1998 Jul.

**Abstract**

Sodium pyrrithione and zinc pyrrithione (NaPT and ZnPT, respectively) are widely used as cosmetic preservatives and metal chelating agents. They are commonly assayed using thin layer chromatography (TLC) and high performance liquid chromatography (HPLC). However, a simple quantitative colorimetric assay has not been previously reported for these compounds. This paper describes the development of a spectrophotometric assay for the quantification of the pyrrithiones which is based on the chelation of copper (II) ions by the biocides. This assay was developed in order to facilitate the determination of the distribution of these biocides in the Gram-negative bacteria *Escherichia coli* NCIMB 10,000 and *Pseudomonas aeruginosa* NCIMB 10,548. Sodium



pyrithione was exhibited only in the cytosol of *E. coli* and *Ps. aeruginosa*. Zinc pyrithione, however, was assayed in the cytosol of both bacteria and was found in the cell envelope of *Ps. aeruginosa*. These findings suggest that the pyrithione biocides are active within bacterial cells as well as at the cell membrane.

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### Citation 16

**Unique Identifier**

98323895

**Authors**[Zeelie JJ.](#) [McCarthy TJ.](#)**Institution**

Unit for Health Services, Port Elizabeth Technikon, Port Elizabeth, South Africa.

**Title**

Effects of copper and zinc ions on the germicidal properties of two popular pharmaceutical antiseptic agents cetylpyridinium chloride and povidone-iodine.

**Source**

Analyst. 123(3):503-7, 1998 Mar.

**Abstract**

The effects of copper and zinc ions on the rate of killing of Gram-negative bacterium *Pseudomonas aeruginosa*, Gram-positive bacterium *Staphylococcus aureus* and fungal yeast *Candida albicans* by antiseptic agents cetylpyridinium chloride and povidone-iodine (Betadine) were investigated. In the 48 test cases copper and zinc ions clearly potentiated the antiseptic agents in 28 (58.3%) cases and exhibited an improved (not clear potentiation) activity in 15 (31.3%) cases. In five (10.4%) cases there was no change in the **antiseptics'** antimicrobial activity. In general zinc potentiated the antiseptic agents more than copper. If an 'improved activity' was the only criterion for this study, then a more rapid antimicrobial effect was observed in 43 out of the 48 test cases, i.e., 90%.

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### Citation 17

**Unique Identifier**

98287644

**Authors**[Darouiche RO.](#) [Green G.](#) [Mansouri MD.](#)**Institution**

Department of Medicine, Baylor College of Medicine, Houston, TX, USA.

**Title**

Antimicrobial activity of antiseptic-coated orthopaedic devices.

**Source**

International Journal of Antimicrobial Agents. 10(1):83-6, 1998 Apr.

**Abstract**

Antimicrobial coating of medical devices, including fracture fixation devices, has evolved as a potentially effective method for preventing device-related infections. We examined the in vitro antimicrobial activity of titanium cylinders coated with the antiseptic combination of chlorhexidine and chloroxylonol. The coated devices provided zones of inhibition against *Staphylococcus epidermidis*, *S. aureus*, ***Pseudomonas aeruginosa***, *Escherichia coli* and *Candida albicans*, at baseline and up to 8 weeks after incubation of the coated cylinders in human serum at 37 degrees C. This durable antimicrobial activity was attributed to the relatively slow leaching of chlorhexidine and chloroxylonol from the coated cylinders as measured by high-performance liquid chromatography. These results suggest that antiseptic-coated orthopaedic devices may provide broad-spectrum and durable antimicrobial protection against device-related infection.

---

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### Citation 18

**Unique Identifier**

98312088

**Authors**[Kuchma T.](#)**Institution**

Laboratory of Biophysical Research Methods of the Research Institute of Microbiology, Russian Medical Academy, Moscow, Russia.

**Title**

Synergistic effect of microwave heating and hydrogen peroxide on inactivation of microorganisms.

**Source**

Journal of Microwave Power & Electromagnetic Energy. 33(2):77-87, 1998.

**Abstract**

*Escherichia coli* K-12 isogenous strains and ***Pseudomonas aeruginosa*** 102 were used to study the synergistic effects of combined microwave heating at short-time processing with low concentrations of hydrogen peroxide. The effect of microwave heating to temperatures of 40, 50 and 60 degrees C, as well as the concentration of hydrogen peroxide (0.05, 0.08 and 0.1%), the sequence of the agents' use, the nature of microorganisms on the survival of cells, DNA damages and interaction factors were studied. A method of anomalous viscosity time dependencies (AVTD) was used for measurement of the changes of genome conformational state (GCS) simultaneously with bacterial survival determination. The synergistic effect of microwave heating and low concentrations of hydrogen peroxide was observed under combined application, and reached a maximum when the cells were exposed to microwave heating to 50 degrees C and 0.08% hydrogen peroxide simultaneously. Both maxima of cell destruction and DNA injuries have been achieved by successive exposure to (MW + 10 min H<sub>2</sub>O<sub>2</sub>) to 60 degrees C and 0.08% hydrogen peroxide. The mechanisms of synergistic effects, the role of a disturbance of DNA repair and the interaction of sublethal injuries caused by different agents are discussed.

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### Citation 19

**Unique Identifier**

98189555

**Authors**Marone P. Monzillo V. Perversi L. Carretto E.**Institution**Bacteriology and Mycology Laboratory, Infectivology Section, IRCCS  
Policlinico S.Matteo, Pavia, Italy.**Title**Comparative in vitro activity of silver sulfadiazine, alone and in  
combination with cerium nitrate, against staphylococci and gram-negative  
bacteria.**Source**

Journal of Chemotherapy. 10(1):17-21, 1998 Feb.

**Abstract**

Silver sulfadiazine (SSD), a topical antimicrobial agent, has been widely used for the prophylaxis and treatment of burn **infections** during the past 30 years. We determined the antimicrobial activity of SSD, alone and in combination with cerium nitrate (CN), gentamicin and amikacin against 130 recent clinical isolates, including multiresistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) or *Pseudomonas aeruginosa*. The overall activity of SSD was good against all the tested strains and it was particularly high against MRSA (MIC<sub>90</sub> 100 microg/ml). CN showed no inhibitory effect, even up to 800 microg/ml, on bacterial strains tested. The combination of SSD and CN was as active as SSD alone. In conclusion, SSD has a broad spectrum of activity at concentrations lower than those commonly used in clinical preparations. All strains were inhibited by less than one-fiftieth of the SSD "in use" concentration (10 mg/ml). Our data confirm the efficacy of this topical agent in the prevention and treatment of **infections** in burns or other surgical wounds and suggest its possible use in clearing staphylococcal carriage as an alternative to mupirocin.

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**Citation 20****Unique Identifier**

98193442

**Authors**Gatter N. Kohnen W. Jansen B.**Institution**Institut für Medizinische Mikrobiologie und Hygiene, Universität zu Köln,  
Germany.**Title**In vitro efficacy of a hydrophilic central venous catheter loaded with silver  
to prevent microbial colonization.**Source**

Zentralblatt für Bakteriologie. 287(1-2):157-69, 1998 Jan.

**Abstract**

A method was developed to load the surface of a central venous catheter with silver to prevent bacterial colonization. Silver confers a broad antimicrobial activity with a relatively low risk of resistance. Catheters were incubated with a silver nitrate solution in different concentrations. The solvent, incubation temperature and incubation period were varied to examine the influence on the

catheter loading. With increasing incubation temperature, time and concentration of silver nitrate, higher rates of silver elution were observed by atomic absorption spectroscopy. Furthermore, by using ethanol-water as a solvent instead of pure water, the amount of silver bound to the catheter surface was enhanced. The release of silver from the catheter surface is mainly controlled by first order kinetics. Antimicrobial efficacy of the modified catheter, in comparison to unloaded catheters, was tested in a stationary and a dynamic model with different microorganisms. Adherence experiments with *Candida albicans* showed almost complete inhibition of growth during a period of 72 hours, including initial adherence. While initial adherence of bacteria could not be prevented, these experiments showed an excellent reduction of bacterial colonization. In a perfusion model, adhesion of *E. coli* could be reduced for at least seven days. Further studies are planned to examine prolonged antimicrobial effects.

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### Citation 21

**Unique Identifier**

98152281

**Authors**[Kuchma T.](#)**Institution**

Laboratory of Biophysical Research Methods, Russian Medical Academy, Moscow, Russia.

**Title**

Modification of bactericidal effects of microwave heating and hyperthermia by hydrogen peroxide.

**Source**

Journal of Microwave Power &amp; Electromagnetic Energy. 32(4):205-14, 1997.

**Abstract**

Two different approaches for studying of bactericidal effects of microwave heating and hyperthermia were introduced. Low concentration of hydrogen peroxide (0.05%) was used to modify the sensitivity of isogenous strains of *Escherichia coli* K-12 to microwave heating and hyperthermia with the following assessment of their combined action. This was carried out simultaneously and successively under equal conditions of temperature rise at 50 degrees C. A method of anomalous viscosity time dependencies (AVTD) was used for measurement of the changes in genome conformational state simultaneously with bacterial survival determination. Experiments were performed to study isolated effects of hyperthermia and microwave heating over a range of temperatures from 40 to 80 degrees C and hydrogen peroxide concentrations from 0.05 to 0.3% during 10-minute exposures and their combined action. No difference was found between isolated effects of microwave heating and hyperthermia when survival of *E. coli* AB 1157 cells was determined. It was shown by the AVTD method that microwave heating at a temperature increase of 6 degrees C per second caused greater damage to cell genome than hyperthermia. The synergistic interaction of microwave heating and low concentrations of hydrogen peroxide was found in simultaneous and successive exposures. The essential distinctions observed in recognition of the action of microwave heating and hyperthermia combined with hydrogen peroxide in various sequences on cellular and molecular levels were attributed to the different effects of microwave and conventional heating on the systems of DNA repair.

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## Citation 22

**Unique Identifier**

98066957

**Authors**

Michel D. Zach GA.

**Institution**

Swiss Paraplegic Center, Nottwil, Switzerland.

**Title**

Antiseptic efficacy of disinfecting solutions in suspension test in vitro against methicillin-resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli* in pressure sore wounds after spinal cord injury.

**Source**

Dermatology. 195 Suppl 2:36-41, 1997.

**Abstract**

In pressure sore wounds after spinal cord injury, methicillin-resistant *Staphylococcus aureus* can be detected in 2% of the cases. The elimination of the germ is the aim of the treatment. Pressure sore wounds are an often found complication after spinal cord injury. For **local** treatment five commercially available **antiseptics** for the skin and mucous membrane were tested in vitro. The method used is a modified qualitative and quantitative suspension test. The **antiseptics** were tested without and with addition of 5% albumin in order to simulate the conditions of the wound in vivo. The results show a superior efficacy of the povidone-iodine preparations. Betadine, probably due to the higher concentration, is more efficacious than Braunol; chlorhexidine is sufficiently efficacious without the addition of albumin. These results still have to be confirmed by in vivo studies.

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## Citation 23

**Unique Identifier**

98066958

**Authors**

Konig B. Reimer K. Fleischer W. Konig W.

**Institution**

Institut fur Medizinische Mikrobiologie, Otto-von-Guericke-Universitat Magdeburg, Germany.

**Title**

Effects of Betaisodona on parameters of host defense.

**Source**

Dermatology. 195 Suppl 2:42-8, 1997.

**Abstract**

The numbers of patients in intensive care units, with immunosuppression, and of elderly people increase in parallel with antibiotic-resistant microorganisms. Therefore the demand for an effective antiseptics increases. Moreover, it became evident that the pathophysiology and the outcome of infection are dependent on the properties of the microorganisms, e.g. synthesis of endo- and

exotoxins, and on the host defense, the immune system. In addition to the microbicidal action, we studied the effects of povidone-iodine (PVP-I, Betaisodona) on the generation, release and activity of exotoxins (alpha-hemolysin, phospholipase C, lipase), as well as on granulocyte-derived tissue-destructive enzymes (elastase, beta-glucuronidase) and microbial-induced cytokine generation from human neutrophils. Our results clearly show that PVP-I does not only kill a wide range of bacteria but also inhibits the generation and release of bacterial exotoxins; furthermore, it also inactivates bacterial exotoxins as well as granulocyte-derived tissue-destructive enzymes and cytokines. These data support the usefulness and efficacy of PVP-I as an effective therapeutic agent to combat infection.

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#### Citation 24

**Unique Identifier**

98090726

**Authors**[George N. Faoagali](#) J. [Muller M.](#)**Institution**

Division of Microbiology, Royal Brisbane Hospital, Herston, Qld., Australia.

**Title**

Silvazine (silver sulfadiazine and chlorhexidine) activity against 200 clinical isolates.

**Source**

Burns. 23(6):493-5, 1997 Sep.

**Abstract**

The study was undertaken to examine the in vitro efficacy of Silvazine against micro-organisms commonly found in burn wounds. Two hundred non-replicative sequential clinical isolates were collected over a 2-month period. These comprised 50 *Staphylococcus aureus* (methicillin sensitive), 50 *Staphylococcus aureus* (methicillin resistant), 50 coagulase negative staphylococci and 50 *Pseudomonas aeruginosa*. As there is no standard test method, the method chosen was a pour plate overlay of micro-organisms placed on a Mueller Hinton base containing duplicate wells of 0.1 ml Silvazine. Plates were incubated at 35 degrees C for up to 48 h prior to examination. All organisms tested showed zones of growth inhibition. The mean diameters of the zones of growth inhibition were similar within genera. *S. aureus* 19.7 +/- 1.6 mm, MRSA 16.9 +/- 1.6 mm, *P. aeruginosa* 15.3 +/- 1.1 mm and coagulase negative staphylococci 20.8 +/- 2.1 mm. There was no bacterial regrowth within the zones of growth inhibition following long-term plate storage. In vitro testing of Silvazine has confirmed its efficiency against common burn wound isolates.

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#### Citation 25

**Unique Identifier**

97391904

**Authors**[Faoagali J.](#) [George N.](#) [Leditschke JF.](#)

**Institution**

Royal Brisbane Hospital, Herston, Queensland, Australia.

**Title**

Does tea tree oil have a place in the topical treatment of burns? [see comments].

**Comments**

Comment in: Burns 1998 Feb;24(1):80-2

**Source**

Burns. 23(4):349-51, 1997 Jun.

**Abstract**

Burnaid is a sorbalene-based cream containing 40 mg/g of tea tree oil and 1 mg/g of triclosan. This investigation was carried out to determine the effect of Burnaid, a commercial tea tree oil preparation, against *Enterococcus faecalis* (ATCC29212), *Staphylococcus aureus* (ATCC29213), *Escherichia coli* (ATCC25922), and *Pseudomonas aeruginosa* (ATCC27853), with the activity of the base product in the commercial preparation. The organisms were suspended in sterile saline (0.5 McFarland Standard) and inoculated onto horse blood agar (*E. faecalis* and *S. aureus*) or Mueller-Hinton agar (*E. coli* and *P. aeruginosa*). One hundred microliters of Burnaid unsterilized, Burnaid sterilized and the base product (Tinasolve) were placed in duplicate in wells cut into the agar plates. Sterility and inactivation cultures were also performed on the samples. None of the samples were found to be contaminated with bacteria prior to testing. Only *S. aureus* and *E. coli* showed zones of growth inhibition around the Burnaid and Tinasolve. Zones of growth inhibition (22 mm) were similar for the active product (Burnaid) and the base (Tinasolve). There was no activity against *E. faecalis* or *P. aeruginosa*. In view of our findings and literature indicating the cytotoxicity of tea tree oil against human fibroblasts and epithelial cells, it is recommended that this product should not be used on burn wounds.

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**Citation 26****Unique Identifier**

97297352

**Authors**

Wilson AP. Lewis C. O'Sullivan H. Shetty N. Neild GH. Mansell M.

**Institution**

Department of Clinical Microbiology, University College London Hospitals, UK.

**Title**

The use of povidone iodine in exit site care for patients undergoing continuous peritoneal dialysis (CAPD).

**Source**

Journal of Hospital Infection. 35(4):287-93, 1997 Apr.

**Abstract**

Exit site infection is a major risk factor for the development of peritonitis in continuous ambulatory peritoneal dialysis. The frequency of infection can be reduced by scrupulous exit site care with or without topical **antiseptics**. A randomized trial was performed of 149 catheters in 130 patients to assess any additional benefits conferred by the use of povidine iodine dry powder spray at dressing changes over an existing strict protocol of exit care. Exit **infections** occurred in 14 (18%) of 77 patients using spray and in 15 (21%) of 72 patients not using spray. The risk of peritonitis was also

similar in each group. The proportion of **infections** caused by *Staphylococcus aureus* was reduced in the spray group, but those caused by *Pseudomonas aeruginosa* were increased. Rash occurred in 6% of those using the spray. The use of the spray did not therefore seem justified.

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## Citation 27

### Unique Identifier

97209973

### Authors

[Gainor BJ](#), [Hockman DE](#), [Anglen JO](#), [Christensen G](#), [Simpson WA](#).

### Institution

Department of Orthopaedic Surgery, University of Missouri Hospital and Clinics, USA.

### Title

Benzalkonium chloride: a potential disinfecting irrigation solution.

### Source

Journal of Orthopaedic Trauma. 11(2):121-5, 1997 Feb-Mar.

### Abstract

**OBJECTIVE:** To determine the disinfecting properties of benzalkonium chloride as an irrigation agent. **DESIGN:** Comparison was made between irrigation of contaminated muscle strips with benzalkonium chloride and normal saline (control). **SUMMARY OF BACKGROUND DATA:** Benzalkonium chloride is a cationic disinfectant, which has questionable efficacy in an organic environment. However, no previous study has attempted to use high volumes of this cationic solution to overcome the neutralizing effect of organic tissue and thus maintain this detergent's germicidal properties. **METHODS:** 2.5 cm x 0.5 cm x 0.5 cm pieces of bovine muscle were aseptically cut from the center of freshly harvested beef muscle and incubated with  $1.0 \times 10^7$  colony forming units of bacteria for 15 minutes. The muscle strips were then irrigated with either 100 mL, 1 L, or 10 L of benzalkonium chloride at a 1:2000 concentration in normal saline. Normal saline was used as the control. The muscle strips were sonicated to remove adherent bacteria; the number of living organisms was determined by quantitatively culturing the sonicate. **RESULTS:** In vitro, benzalkonium chloride was superior to normal saline at disinfecting bovine muscle ( $p < \text{or} = 0.001$ ). When 10 L of benzalkonium chloride irrigation was used, no living bacteria could be recovered ( $p < \text{or} = 0.012$ ). **CONCLUSION:** In this experimental setting benzalkonium chloride was an effective disinfection agent, with enhanced activity at large volumes.





# **EXHIBIT 15**



Results of your search : **2 and 4**

Citations available: 27

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### Citation 1

polyhexamethylene  
biguanide (PHMB)  
+  
Chondroitin sulfate  
(CS)

**Unique Identifier**

20134280

**Authors**

Muller G. Kramer A.

**Institution**

Institute of Hygiene and Environmental Medicine, University of Greifswald,  
Germany.

**Title**

In vitro action of a combination of selected antimicrobial agents and  
chondroitin sulfate.

**Source**

Chemico-Biological Interactions. 124(2):77-85, 2000 Jan 15.

**Abstract**

Chondroitin sulfate (CS), a highly anionic polymer and the most predominant sulfated glycosaminoglycan in connective tissues, was investigated regarding to its interaction with cationic disinfectants, which are used as antiinfectives in humans. Combinations of cetylpyridiniumchloride (CPC), chlorhexidine (CHex), and polyhexamethylene biguanide (PHMB) with CS, respectively, were prepared and the resulting microbicidal activity of the mixtures was tested in the quantitative suspension test without organic matter. Polyvidone-iodine and Ringer's solution were used as controls. Even precipitated, the resulting test combinations behave differently against *Staphylococcus aureus*, *Enterococcus faecium*, *Escherichia coli*, ***Pseudomonas aeruginosa***, and *Candida albicans*. CPC/CS demonstrated only microbicidal activity against Gram-positive bacteria, and CHex/CS was more active against Gram-negative bacteria and *C. albicans*. PHMB/CS, especially in combination with CS-A, only revealed an antimicrobial effect against ***P. aeruginosa*** after 60 min action. The interaction of cationic disinfectants with CS showed depending on the investigated microorganism a more or less controlled sustained release manner of the microbicidal agent from the precipitated complex, with the only exception of PHMB in combination with CS-C, which is completely neutralized. Polyvidone-iodine and Ringer's solution were not affected by CS.

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### Citation 2

**Unique Identifier**

99395061

**Authors**

Hoang TT. Schweizer HP.

**Institution**

Department of Microbiology, Colorado State University, Fort Collins, Colorado  
80523, USA.

## Title

Characterization of *Pseudomonas aeruginosa* enoyl-acyl carrier protein reductase (FabI): a target for the antimicrobial triclosan and its role in acylated homoserine lactone synthesis.

## Source

Journal of Bacteriology. 181(17):5489-97, 1999 Sep.

## Abstract

The *Pseudomonas aeruginosa* fabI structural gene, encoding enoyl-acyl carrier protein (ACP) reductase, was cloned and sequenced. Nucleotide sequence analysis revealed that fabI is probably the last gene in a transcriptional unit that includes a gene encoding an ATP-binding protein of an ABC transporter of unknown function. The FabI protein was similar in size and primary sequence to other bacterial enoyl-ACP reductases, and it contained signature motifs for the FAD-dependent pyridine nucleotide reductase and glucose/ribitol dehydrogenase families, respectively. The chromosomal fabI gene was disrupted, and the resulting mutant was viable but possessed only 62% of the total enoyl-ACP reductase activity found in wild-type cell extracts. The fabI-encoded enoyl-ACP reductase activity was NADH dependent and inhibited by triclosan; the residual activity in the fabI mutant was also NADH dependent but not inhibited by triclosan. An polyhistidine-tagged FabI protein was purified and characterized. Purified FabI (i) could use NADH but not NADPH as a cofactor; (ii) used both crotonyl-coenzyme A and crotonyl-ACP as substrates, although it was sixfold more active with crotonyl-ACP; and (iii) was efficiently inhibited by low concentrations of triclosan. A FabI Gly95-to-Val active-site amino acid substitution was generated by site-directed mutagenesis, and the mutant protein was purified. The mutant FabI protein retained normal enoyl-ACP reductase activity but was highly triclosan resistant. When coupled to FabI, purified *P. aeruginosa* N-butyryl-L-homoserine lactone (C4-HSL) synthase, RhII, could synthesize C4-HSL from crotonyl-ACP and S-adenosylmethionine. This reaction was NADH dependent and inhibited by triclosan. The levels of C4-HSL and N-(3-oxo)-dodecanoyl-L-homoserine lactones were reduced 50% in a fabI mutant, corroborating the role of FabI in acylated homoserine lactone synthesis in vivo.

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Citation 3

decreased resistance to

- chlorhexidine diacetate (CHA)  
- Cetylpyridinium Chloride (CPC)

\* triclosan

## Unique Identifier

99368868

## Authors

Tattawasart U. Maillard JY. Furr JR. Russell AD.

## Institution

Welsh School of Pharmacy, Cardiff University, Wales.

## Title

Development of resistance to chlorhexidine diacetate and cetylpyridinium chloride in *Pseudomonas stutzeri* and changes in antibiotic susceptibility.

## Source

Journal of Hospital Infection. 42(3):219-29, 1999 Jul.

## Abstract

The rate of positive wound cultures in this model due to *S. aureus* is not decreased by irrigation with CS; however, the rate of positive wound cultures is safely and effectively decreased with the use of BzC.

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### Citation 5

**Unique Identifier**

99306046

**Authors**Lloyd DH. Lamport AI.**Institution**Department of Small Animal Medicine and Surgery, Royal Veterinary College,  
Hertfordshire.**Title**Activity of chlorhexidine shampoos in vitro against *Staphylococcus intermedius*, *Pseudomonas aeruginosa* and *Malassezia pachydermatis*.**Source**

Veterinary Record. 144(19):536-7, 1999 May 8.

---

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### Citation 6

**Unique Identifier**

99271898

**Authors**Yin HQ. Langford R. Burrell RE.**Institution**

Westaim Biomedical Corp, Fort Saskatchewan, Alberta, Canada.

**Title**

Comparative evaluation of the antimicrobial activity of ACTICOAT antimicrobial barrier dressing.

**Source**

Journal of Burn Care &amp; Rehabilitation. 20(3):195-200, 1999 May-Jun.

**Abstract**

This study evaluated the antimicrobial activity of ACTICOAT Antimicrobial Barrier Dressing (Westaim Biomedical Corp, Fort Saskatchewan, Alberta, Canada), a silver-coated wound dressing, and compared it with silver nitrate, silver sulfadiazine, and mafenide acetate. The minimum inhibitory concentrations (MIC), minimum bactericidal concentrations (MBC), zone of inhibition, and killing curves were determined with 5 clinically relevant bacteria. The data indicate that ACTICOAT silver had the lowest MIC and MBC and generated similar zones of inhibition to silver nitrate and silver sulfadiazine. Viable bacteria were undetectable 30 minutes after inoculation with the dressing, whereas it took 2 to 4 hours for silver nitrate and silver sulfadiazine to achieve the same result. Mafenide acetate generated the biggest zones of inhibition, but it had the highest MICs and MBCs,

Mafenide acetate  
(biggest ZI, but highest  
MIC, MBC)

# **EXHIBIT 16**

## Genidine [Gentian violet (GV) + Chlorhexidine (CHX)]

Impregnating with DCM solution of Genidine.

	MRSA <sub>2066</sub>	PS <sub>4205</sub>	C. Parap.1-100-0022
PVC <sup>□</sup> (7.0 mm I.D)	28:28 [24:26]	21:21 [14:15] <sup>□</sup>	27:28 [25:25]
Si <sup>□</sup>	17:17 (18:19) <sup>□</sup> [21:20 ]	5:3 (11:12) <sup>□</sup> [6:0]	21:21 (19:19) <sup>□</sup> [23:24]
PU <sup>□</sup> (2Lumen; 10 FR.)	21:21 [19:19]	14:13* [14:14]	27:26 [21:21]
Suture <sup>□</sup> (silk)	17:17 [16:16]	5:3 [2:3]	21:21 [12:12]

<sup>□</sup> Immersed for 10 min.

<sup>□</sup> Immersed for 2 h. except for the 10 FR. Silicone, which were immersed for 20 h.

<sup>□</sup> Values are for 5 FR. Single lumen and those in parenthesis are for a double-lumen Cook 10.0 FR catheter.

\*Gave a 17 mm zone against the multi-resistant PS4277, while mino-rifampin control yielded 3 mm.

<sup>□</sup> values between [ ] are for addition of 2 eq. Base instead of 3 eq.

Second Trial:

	MRSA <sub>2066</sub>	PS <sub>4205</sub>	C. Parap.1-100-0022
PVC <sup>□</sup> (7.0 mm I.D)	28:29	22:23	27:27
Si <sup>□</sup> (2 lumen, 10 FR)	19:19 (19:20) <sup>φ</sup>	10:11 (12:13) <sup>φ</sup>	18:18 (24:25) <sup>φ</sup>
PU <sup>□</sup> (2lumen; 10 FR.)	22:22	15:15	22:23
Suture <sup>□</sup>	15:15	4:4	14:14

<sup>□</sup> Immersed for 1h.

<sup>□</sup> Immersed for 2h.

<sup>φ</sup> Values in parenthesis are for 20h immersion.

Control 1<sup>□</sup>: CHX in (DCM + Methanol)<sup>□</sup> and in Methanol

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap.1-100-0022	
	DCM+MeOH	MeOH	DCM+MeOH	MeOH	DCM+MeOH	MeOH
PVC	0:0	0:0	0:0	0:0	0:0	0:0
Si	0:0	0:0	0:0	0:0	0:0	0:0
PU	17:17	11:11	10:10	0:0	15:15	0:0
Sutu re	0:0	0:0	0:0	0:0	0:0	0:0

<sup>□</sup> All immersed for 2 h.

<sup>□</sup> About 33% DCM/MeOH (v/v)

Control 2: GV in DCM and methanol

	MRSA <sub>2066</sub>	PS <sub>4205</sub>	C. Parap.1-100-
--	----------------------	--------------------	-----------------

					0022	
	DCM	MeOH <sup>φ</sup>	DCM	MeOH <sup>φ</sup>	DCM	MeOH <sup>φ</sup>
PVC <sup>□</sup>	25:25	20:21	0:0	0:0	27:27	18:19
Si <sup>□</sup> (2 lumen, 10 FR)	6:7	7:8	0:0	0:0	0:0	0:0
PU <sup>□</sup> (2 lumen; 10 FR.)	22:22	32:32	0:0	0:0	22:23	31:32
Suture <sup>□</sup>	8:8	10:11	0:0	0:0	0:0	0:0

<sup>□</sup> Immersed for 10 min. <sup>□</sup> Immersed for 2 h.

<sup>φ</sup> All devices immersed for 2 h.

Genidine in methanol:

	MRSA <sub>2066</sub>	PS <sub>4205</sub>	C. Parap. <sub>1-100-0022</sub>
PVC	24:25	13:13	23:23
Si	10:12	0:0	0:0
PU	17:17	7:0	16:17
Suture	10:10	0:0	5:6

## Experimental:

### A. Impregantion Procedure

7.35 ml of 1M solution potassium *t*-butoxide in THF was added to a solution of CHX diacetate (1.533g; 2.45 mmol) in 35 ml THF. The resulting heterogeneous solution was stirred for 20 min, then added to a solution GV (1.0 g; 2.45 mmol) in 30 ml THF. The mixture was stirred at ambient conditions for 1 h, then placed under the hood overnight to evaporate the solvent. The resulting residue was dissolved in 30 ml DCM. One-centimeter device segments were immersed in the DCM solution for the appropriate periods: PVC & PU for 10 min; Si & Silk Suture for 2 h. After removal of the devices from the solution, traces of solution was removed from the lumen, then placed under the hood to dry over night. The impregnated devices were washed with distilled water until the washings were colorless or very faint, then placed under an aseptic hood to dry under ambient conditions for at least 4 h, preferably over night.

### B. Zones of Inhibition

BBL Mueller Hinton II agar plates were inoculated with 0.5 McFarland of the appropriate microorganism. The impregnated devices were embedded in the inoculated plates and placed in an incubator at about 37.5° for at least 18 h. Zones of inhibition were then measured and corrected for yeast after incubation for several additional hours.

**Durability of Polyurethane & Silicone Impregnated with GV-CHX**

**Zones of Inhibition against MRSA<sub>2066</sub>.**

Catheter	Day=0	Day=3	Day=7	Day=10	Day=17	Day=30	Day=45	Day=61
PU	21:21	18:18	16:16	15:14	14:14	11:11	8:8	
Si	21:21	18:18	15:15	11:11	11:11	7:8	0:0	
	Day=75							
PU								
Si								

**Alternative preparation of Gendine**

The neutral form of chlorhexidine [55-56-1] is used instead of the salt form. Hence, .0025 mol of chlorhexidine is added to a stirring heterogeneous solution of 1 g of GV in 60 ml anhydrous THF at room temperature, and the resulting mixture is stirred for 1 h, then placed under the hood to evaporate the solvent. The resulting residue was dissolved in 30 ml DCM. The product did not totally dissolve in DCM.

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap.1-100-0022	
	Salt	Neutral	Salt	Neutral	Salt	Neutral
PVC	28:28	29:29	21:21	19:19	27:28	30:30
Si	18:19	21:21	11:12	9:9	21:21	22:22
PU	21:21	23:23	14:13	12:12	27:26	22:22
Suture	17:17	16:16	5:3	2:4	21:21	15:15

**Genidine in methanol:**



Again placed under the hood to evaporate DCM. The resulting residue was dissolved in 30 ml MeOH, but the residue did not totally dissolve.

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap.1-100-0022	
	Salt	Neutral	Salt	Neutral	Salt	Neutral
PVC	24:25	21:22	13:13	12:12	23:23	20:20
Si	10:12	15:15	0:0	0:0	0:0	8:9
PU	17:17	19:19	7:0	12:12	16:17	12:12
Suture	10:10	12:13	0:0	0:0	5:6	7:7

### Durability of Gendine-Coated Silicone UT Catheter

#### **Zones of Inhibition against EN<sub>3836</sub>(VRE and E. Coli <sub>3226</sub> after immersion in Urine.**

Organism	Day=0	Day=3	Day=7	Day=14	Day=21	Day=28	Day=35	Day=42	Day=49
EN <sub>3836</sub>	23:23	20	19:19	17:15	13:15	14:13	13		
E. Coli	18:18	15	13:13	13:12	12:12	12:11	11		

Day=0 against MRSA<sub>2066</sub> = 26:27; against Ps = 18:18; against C. parap. = 24:25

### Durability of Gendine-Coated ET PVC Tube

#### **Zones of Inhibition against PS after immersion in Urine.**

Organism	Day=0	Day=3	Day=7	Day=14	Day=21	Day=28	Day=35	Day=42	Day=49
EN <sub>3836</sub>	23:23	20	19:19	17:15	13:15	14:13	13		

### Impregnating with Gendine in BuOAc at 40° C

The procedure is that adopted from the patent. CHX was added to a solution of GV in 30 ml *n*-BuOAc at room temp, then about 3 ml of MeOH was added. The resulting mixture along with the devices were heated for one hour at 40°C.

	MRSA <sub>2066</sub>	PS <sub>4205</sub>	C. Parap.1-100-0022
PVC	27:27	17:17	26:26

Si	17:17	0:0	18:18
PU	19:19	13:14	20:20
Silk	14:14	5:5	14:14

**Impregnating with Gendine in 25 ml DCM + 5 ml BzOH**

	MRSA <sub>2066</sub>	Ps <sub>4205</sub>	C. Parap. <sub>1-100-0022</sub>
PVC	23:23	13:17	23:23
Si	18:18	0:0	17:17
PU	20:20	17:17	20:20
Silk	11:11	0:0	9:9

### **Impregnating Biliary Stents with Gendine**

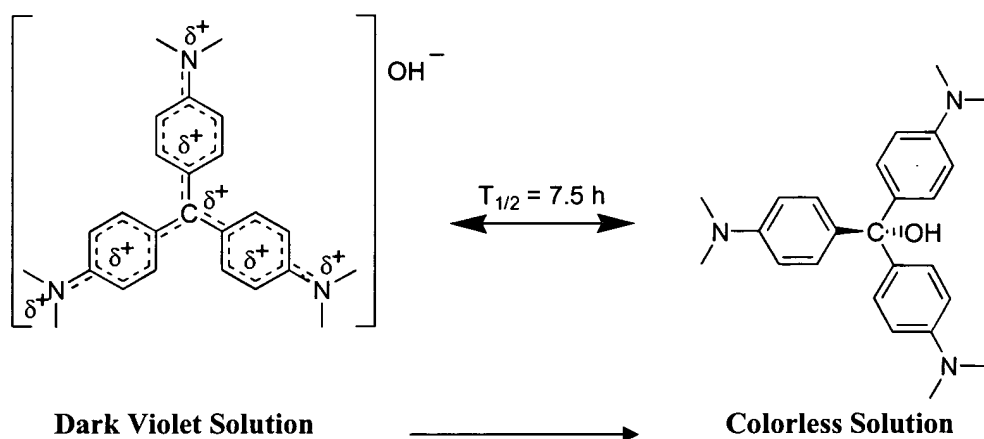
One-centimeter segments were immersed in a DCM solution of Gendine over night. After drying overnight at ambient conditions, the segments were placed in a tube, washed with distilled water, then dried under the aseptic hood over night at ambient conditions. Then the impregnated pieces were embedded in inoculated Mueller-Hinton agar plates, and incubated over night. The resulting zones are given below.

#### **Zone of Inhibition (mm) for Gendine-impregnated Biliary Stents.**

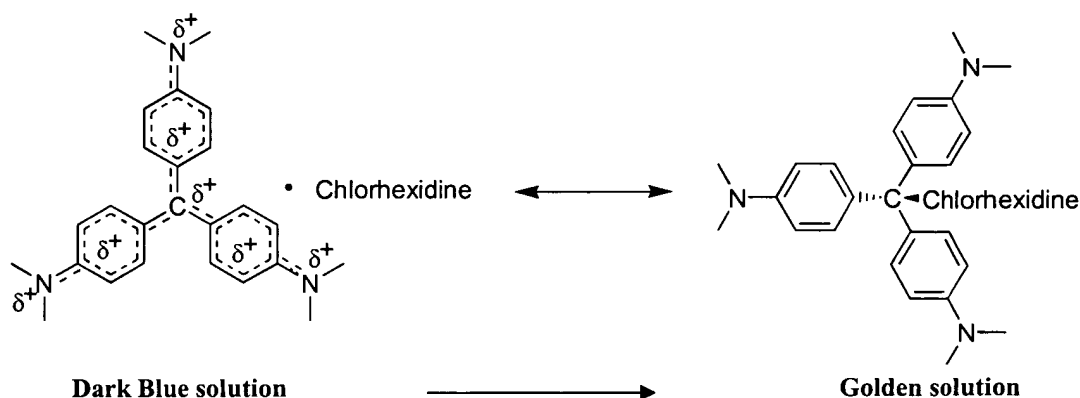
<b>Microorganism</b>	<b>Zone</b>
MRSA <sub>2066</sub>	20
Ps <sub>4205</sub>	8
E. Coli <sub>3202</sub>	10:11
E. Coli <sub>3203</sub>	11:11
E. Coli <sub>3226</sub>	11
Kb <sub>2461</sub>	9:9
Kb <sub>2548</sub>	9:10
Kb <sub>2556</sub>	6:10
EN <sub>3836</sub> (VRE)	17
C. Albican <sub>64551</sub>	25
C. Parap <sub>1-100-0022</sub>	18

## I. Characterization and Structure of Gendine

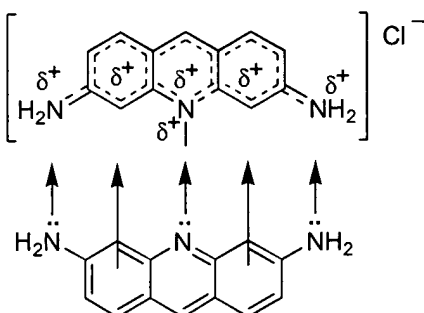
The molecular structures and electronic states of gentian violet has been the subject of extensive studies driven by the observed inhomogeneity of its absorption spectra.<sup>1</sup> In agreement with our observations, Goldacre and Phillips demonstrated the bleaching of gentian violet in the presence of hydroxide. They attributed bleaching to nucleophilic attack of the hydroxide unto the benzylic carbonium center.<sup>2</sup>



Similar bleaching is also observed in our laboratory for Gendine, both in methanol and dichloromethane. This is consistent with the presence of both uncharged and a charged gentian violet moiety in Gendine, where the latter is responsible for imparting the color

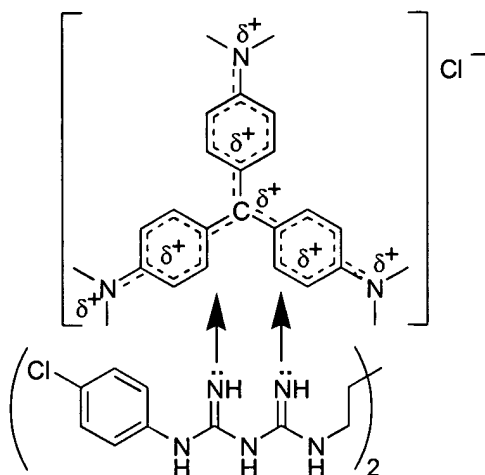


due to the extensive electronic delocalization. Consequently, and similar to that found for the acridinium dye Acriflavin<sup>3</sup>, Gendine must exist initially as an EDA (electron Donor-

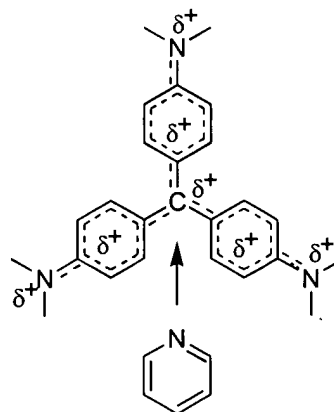


**Acrilflavin**

Acceptor) complex formed between the cationic gentian violet and chlorhexidine, which is also similar to that observed for gentian violet and pyridine ( $GV^+ \cdot Py$ ).<sup>4</sup>

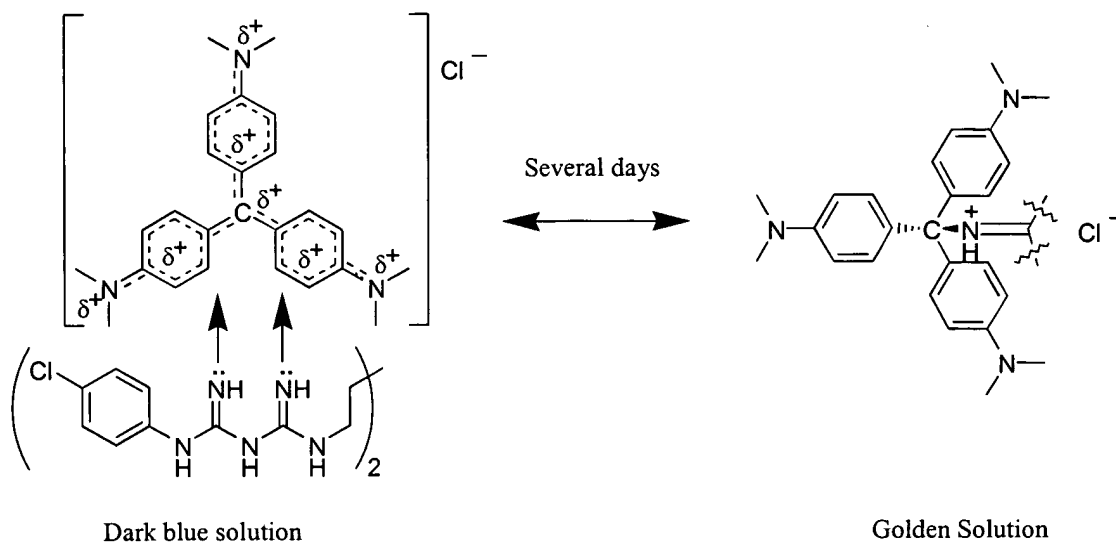


**Gentine**



**GV<sup>+</sup>·Py**

As a result, and at any given time, a solution of Gentine can consist of a mixture of both structural isomers. Meanwhile, zones of inhibition exhibited by devices impregnated with



both solutions rule out conformational isomerism and confirm the presence of structural isomers, since it is expected for conformational isomers to impart similar zones. The data given below support existence of the two structural isomers for Gendine, the EDA "charge-transfer" complex and the covalently bonded isomer.

Zones of Inhibition (mm) for Gendine-Impregnated Devices

	Blue Solution			Golden Solution		
	MRSA	PS	C. Parap.	MRSA	PS	C. Parap.
PVC <sup>□</sup>	28:28	22:22	27:28	22:23	15:15	21:21
PU <sup>□</sup>	21:21	15:15	22:23	19:19	13:13	17:17

<sup>□</sup>The color of the device is dark blue when impregnated with the blue solution, and is light gold (turns darker over night) when impregnated with the light golden solution.

<sup>□</sup>The color of the device is dark blue when impregnated with the blue solution, and is light gray when impregnated with the light golden solution.

## II. Durability and Stability

For long-term intravenous therapy, Schierholz *et al.* pointed out the importance of continued release (exceeding 10 days) of antimicrobial, and attributed failure of infection prevention with chlorhexidine- silver sulfadiazine coated catheters to the decreased release beyond 48 hours.<sup>5</sup>

For gendine-impregnated catheters, the efficacy and stability in human serum is being studied for polyurethane (PU) and silicone (Si). As of this date, results show continued release of gendine beyond 30 days (Table 1).

**Table 1.** Zone of Inhibition (mm) against MRSA<sub>2066</sub> after incubation in Human Serum .

Catheter	Day=0	Day=3	Day=7	Day=10	Day=17	Day=31	Day=45	Day=60
PU	21:21	18:18	16:16	15:14	14:14	11:11		
Si	21:21	18:18	15:15	11:11	11:11	7:8		

## References

- <sup>1</sup> Maruyama, Y.; Ishikawa, M.; Satozono, H. *J. Am. Chem. Soc.* **1996**, *118*, 6257-6263.
- <sup>2</sup> Goldacre, R. J.; Philips, J. N. *J. Chem. Soc.*, **1949**, 1724-32.
- <sup>3</sup> *Merck Index* **12**, 125.
- <sup>4</sup> Liang, E. J.; Ye, X. L.; Kiefer, W. *J. Phys. Chem.*, **1997**, *101*, 7330-7335.
- <sup>5</sup> Schierholz, J.; Lefering, R.; Neugebauer, E.; Beuth, J.; König, D-P. Pulverer, G. Central Venous Catheters and Bloodstream Infection, *JAMA*, **2000**, *28*, 477.

Comparing zones of inhibition against *pseudomonas aeruginosa* that was cultured from Ruth A. Morrison (# 421222) as imparted by (a) the cook triple lumen polyurethane cvc, and (b) Gendine-impregnated triple lumen polyurethane.

<b>Origin</b>	<b>Cook</b>	<b>Gendine</b>
Peripheral	4 mm	13 mm
CVC	4mm	13mm

## Brilliant Green

BG in DCM &amp; MeOH

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap. <sub>1-100-0022</sub>	
	DCM	MeOH	DCM	MeOH	DCM	MeOH
PVC	30:30	16:17	0:0	0:0	27:27	11:11
Si	0:0	0:5	0:0	0:0	0:0	0:0
PU	20:20	18:18	0:0	0:0	25:25	21:21
Silk	8:9	10:11	0:0	0:0	0:0	7:7

BG<sup>+</sup>·I<sup>-</sup> in DCM and Acetone

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap. <sub>1-100-0022</sub>	
	DCM	Me <sub>2</sub> CO	DCM	Me <sub>2</sub> CO	DCM	Me <sub>2</sub> CO
PVC	18:18	18:19	0:0	0:0	13:13	11:11
Si	16:23	17:18	0:0	0:0	13:13	12:12
PU	20:20	24:24	0:0	0:0	17:17	12:12
Silk	12:12	10:11	0:0	0:0	8:8	7:7

BG<sup>+</sup>·CHX<sup>-</sup>/DCM

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap. <sub>1-100-0022</sub>	
	DCM <sup>□</sup>	MeOH <sup>□</sup>	DCM	MeOH	DCM	MeOH
PVC	23:23	21:21	18:18	0:0	18:18	21:22
Si	14:17	15:14	8:9	0:0	18:18	6:8
PU	19:21	16:16	14:14	9:9	17:17	15:15
Silk	11:11	12:13	4:4	2:2	6:7	10:10

□ slightly soluble. □ Immersed for 24 h.

Brilliant Green (BG) with &amp; without Chlorhexidine (CHX)\*

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap. <sub>1-100-0022</sub>	
	BG	BG <sup>+</sup> ·CHX <sup>-</sup>	BG	BG <sup>+</sup> ·CHX <sup>-</sup>	BG	BG <sup>+</sup> ·CHX <sup>-</sup>
PVC	30:30	23:23	0:0	18:18	27:27	18:18
Si	0:0	14:17	0:0	8:9	0:0	18:18
PU	20:20	19:21	0:0	14:14	25:25	17:17
Silk	8:9	11:11	0:0	4:4	0:0	6:7

\*From DCM

Brilliant Green + Gentian violet, 1:1

	MRSA <sub>2066</sub>		PS <sub>4205</sub>		C. Parap. <sub>1-100-0022</sub>	
	DCM	MeOH	DCM	MeOH	DCM	MeOH
PVC	28:28	17:17	13:13*	0:0	29:29	13:13
Si	8:9	0:0	0:0	0:0	0:0	0:0
PU	24:24	20:20	11:12*	0:0	26:26	17:17
Silk	7:7	7:7	0:0	0:0	0:0	0:6

\*Bacteristatic



### **Durability of Polyurethane & Silicone Impregnated with GV·CHX**

#### **Zones of Inhibition against MRSA<sub>2066</sub> after x Days Incubation in Human Serum**

Catheter	Day=0	Day=3	Day=7	Day=10	Day=17	Day=31	Day=46	Day=61
PU	21:21	18:18	16:16	15:14	14:14			
Si	21:21	18:18	15:15	11:11	11:11			

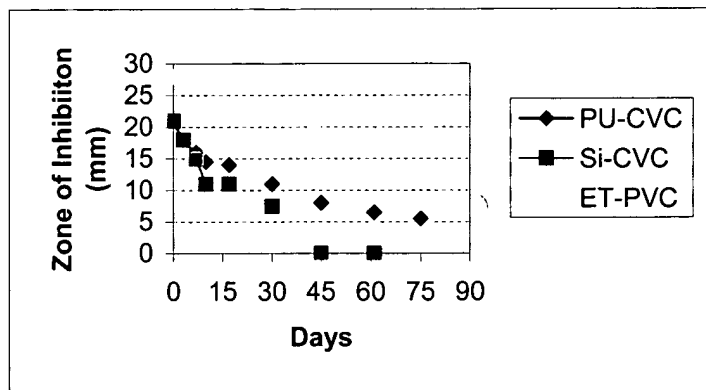
### **Durability of GV·CHX-coated Silicone UT Catheter**

#### **Zones of Inhibition against EN<sub>3836</sub>(VRE and E. Coli <sub>3226</sub> after x Days Incubation in Human Urine**

Organism	Day=0	Day=3	Day=7	Day=14	Day=21	Day=28	Day=35	Day=42	Day=49
EN <sub>3836</sub>	23:23	20	19						
E. Coli	18:18	15	13						

Day<sub>0</sub> against MRSA<sub>2066</sub> = 26:27; against Ps = 18:18; against C. parap. = 24:25

	<b>0</b>	<b>3</b>	<b>7</b>	<b>10</b>	<b>14</b>	<b>17</b>	<b>21</b>	<b>28</b>
<b>PU</b>	21	18	16	14.5		14		
<b>Si</b>	21	18	15	11		11		
<b>ET-PVC</b>	28				23		22	22.5

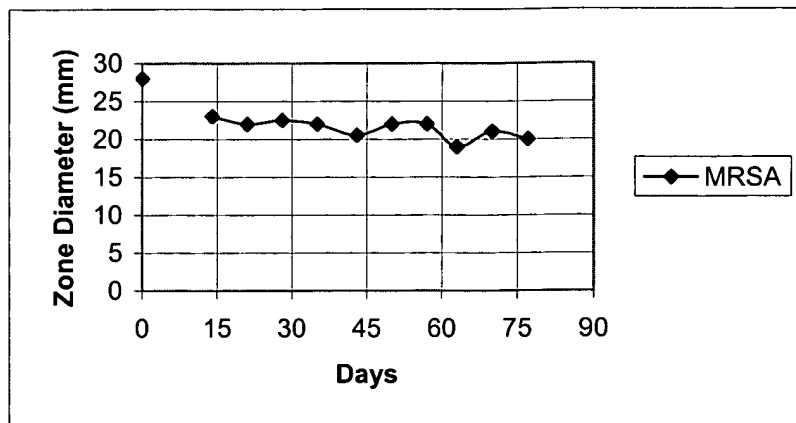


<b>30</b>	<b>35</b>	<b>43</b>	<b>45</b>	<b>50</b>	<b>57</b>	<b>61</b>	<b>63</b>	
11			8			6.5		
7.5			0			0		
	22	20.5		22	22		19	21

75  
5.5

77  
  
20

MRSA	0	7	10	14	21	28	35	43
	28			23	22	22.5	22	20.5



50	57	63	70	77
22	22	19	21	20

## **Durability of Gendine-Impregnated Devices**

### **I. Durability of Polyurethane & Silicone Impregnated with GV-CHX**

#### **Zones of Inhibition against MRSA<sub>2066</sub> after Incubation in Human Serum.**

Catheter	Day=0	Day=3	Day=7	Day=10	Day=17	Day=30	Day=45	Day=61
PU	21:21	18:18	16:16	15:14	14:14	11:11	8:8	6:7
Si	21:21	18:18	15:15	11:11	11:11	7:8	0:0	0:0
	Day=75							
PU	5:6							
Si	ND							

ND = Not done

### **II. Durability of Gendine-Coated Silicone UT Catheter**

#### **Zones of Inhibition against EN<sub>3836</sub>(VRE) and E. Coli<sub>3226</sub> after Incubation in Human Urine.**

Organism	Day=0	Day=3	Day=7	Day=14	Day=21	Day=28	Day=35	Day=42	Day=49
EN <sub>3836</sub>	23:23	20	19:19	17:15	13:15	14:13	13:15	15:10	11:17
E. Coli	18:18	15	13:13	13:12	12:12	12:11	11:11	11:11	11:11
	Day=56	Day=63	Day=70	Day=78	Day=85	Day=92	Day=99	Day=106	
EN <sub>3836</sub>	14:17	14:18	14:19	13:16	17:17	17:17	15:15	14	
E. Coli	11:9	0:0	0:0	0:0	-				

Day=0 against MRSA<sub>2066</sub> = 26:27; against Ps<sub>4205</sub> = 18:18; against C. parap.<sub>1-100-0022</sub> = 24:25

### **III. Durability of Gendine-Coated ET PVC Tube**

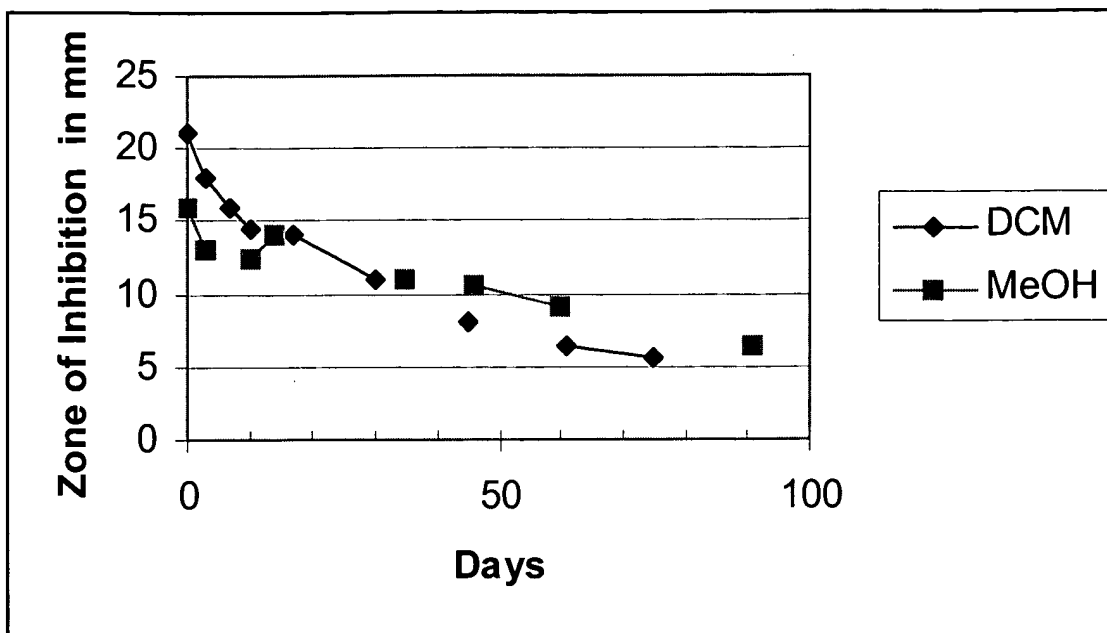
#### **Zones of Inhibition after Incubation in Human BAL.**

Organism	Day=0	Day=7	Day=10	Day=14	Day=21	Day=28	Day=35	Day=43	Day=50
PS <sub>4205</sub>	20:20	11:11	0:0						
MRSA <sub>2066</sub>	28:28	ND	ND	23:23	22:22	22:23	22:22	20:21	22:22
	Day=57	Day=63	Day=70	Day=77					
MRSA <sub>2066</sub>	22:22	19:19	21:21	20:20					

ND= Not done

### **IV. Durability of Gendine-coated Polyurethane against MRSA<sub>2066</sub> using methanol as impregnating solvent**

Day=0	Day=3	Day=7	Day=10	Day=14	Day=35	Day=46	Day=60	Day=91	
16:16	13:13	ND	12:13	14:14	11:11	10:11	9:9	7:6	



**Figure 1. Comparison in durability between DCM and Methanol methods for impregnating polyurethane with Gendine upon incubation at 37° in human serum**



### **Durability of polyurethane impregnated with GV (Gentian Violet).**

About 30 one-centimeter sterilized double-lumen catheters (beige) were immersed in a solution of 2 g of GV in 60 ml MeOH (methanol) for 2 h. Catheters were removed from the solution, and traces of solution were removed from the lumen, then allowed to dry over night under the hood. The catheters were washed with distilled water (by shaking the catheters with water in a tube) till the washings were colorless or faint after which the catheters were allowed to dry for at least 4 h. The impregnated catheters were placed in a tube and covered with human serum (Sigma, # S7023), and allowed to stand for the appropriate period @ 37.5° C. Serum was replaced each time catheters were removed. The serum-soaked impregnated catheters were allowed to dry for at least 4 h, then embedded in agar plates (MH II) streaked with appropriate microorganism, and the plates were incubated for 24 h (corrected after 48 h). The resulting zones of inhibition are given below along with the control using cook catheters (impregnated with minocycline-rifampin).

### **Durability of polyUrethane Impregnated with GV (pUGV).**

#### **Zones of Inhibition against MRSA<sub>2066</sub>.**

Catheter	Day=0	Day=3	Day=7	Day=10	Day=17	Day=31	Day=46	Day=61
pUGV	24:24	20:20	19:19	21:21	16:16	15:13	12:12	12:10
Cook	22:22	17:16	20:20	21:21	29:30	11:11	7:7	0:0
	Day=75							
pUGV	9:10							
Cook	0:0							

\*Cook catheter as control

Dr. Raad...

1. Results of doubling the concentration are given in Table 4.
2. Table 5 summarizes results for GV<sup>+</sup> PCMX<sup>+</sup> using DCM. Notice the zones for silicone.
3. The SIC catheters from Jim Yardly arrived yesterday. I have not done the experiments. I am trying to get hold of Al because I need the voltmeter.
4. Obtained similar zone of inhibition against MRSA for the arrow using both commercially available Mueller Hilton and TSA agar plates, where the zone are 18 mm.

**Table 4. Comparison Between Zones at Concentrations 1x and 2x.**

Catheter	MRSA <sub>2068</sub>		PS <sub>3681</sub>		C. Parap. <sub>1-100-0022</sub>	
	1x	2x	1x	2x	1x	2x
ET-PVC	24:26	28:29	15:16	20:21	25:29	28:29
Si	12:13	13:13	0:0	0:0	14:15	13:13
PU	20:20	21:21	8:10	12:12	20:21	25:22
Silk	15:15	17:18	0:0	0:0	12:14	18:22

1x refers to 2.25 mmol of GV<sup>+</sup>PCMX<sup>+</sup> dissolved in 30 ml MeOH. 2x refers to 4.50 mmol.

**Table 5.**

Catheter	GV <sup>+</sup> PCMX <sup>+</sup> in DCM		
	MRSA	Ps	C. Parap.
ET-PVC	25	19	25
Si	20	12	18
PU	19	15	21
Silk	16	0:0	13

\*Catheters are dipped in the solution until swelling becomes visible (few minutes).

Best wishes,

Nabeel

Cholestin } anti-proliferational abx.  
polymixin }

Chloramine

Chlorhexidine - thymol varnish (Cervitec)

acetic acid

Zinc Chloride

Na hypochlorite

methyl isothiazolone

India "Gentian violet impreg silicone"

Dr. Raad

UTI, ventil. assoc.

✓ Comb. Gentian violet  
Indian Medical Research  
get article

works less: ethane, methane

works best methylene Chloride

4/21/00

\* Donna  
Pfizer

212 733 6632 med fax #

- (1) Icthammol (used: glycerol in ear drops)
- (6) staph. aureus ZI = 18 mm
- Strep. pyogenes ZI = 23 mm
- no activity against *proteus mirabilis*,  
*P. aeruginosa*, *E. coli* (*C. albicans*, weakly inhibited)
  - active against  $G^+ org.$
  - has anti-inflammatory action.
- need anti- $G^-$  combined with it

- (2) Mercurochrome (used in fungal ear infect.)
- has antifungal effect: *Aspergillus niger*  
*A. flavus*  
*A. fumigatus*  
*Candida*  
*Mucor*

- (3) 0.25% Chlorhexidine gluconate + 0.25% benzalkonium chloride + 4% benzyl alcohol  
VS. 10% Povidone iodine → Betadine

used as solutions for CVC, arter. cath. care

- chlorhexid. soln. was superior to povidone iodine against  $G^+$  bacteria
- chlorhex. soln. was nonsignificantly superior against  $G^-$  bact. [ $p = 0.8$ ]  
 $p = 0.5$

④ S-Carboxymethylcysteine and its monohydrate  
lysine salt (used orally for otitis media  
with effusion)

pts. benefited (avoiding surgical Rx) 2.31 times  
more often than similar patients receiving placebo.

⑤ Sanguinarine (used as subgingival irrigation)  
for gingivitis

↓ plaque formation and probing depth  
(index for gingivitis)

⑥ glycerine-ichthammal: G+

⑦ ~~⑧~~ Sphingosine and Sphinganine  
(free sphingolipids of the stratum corneum)

- 200 micrograms/cm<sup>2</sup> of sphinganine in ethanol  
(50 microliters of a 1.6% soln.)

→ up to 3 log reductions in microorg.

- Sphingolipids: antimicrobial agents of the  
cutaneous barrier

Strongly inhibit bacteria, fungi;  
(Staph. aureus, C. albicans, Trichophyton-  
mentagrophytes)

- ⑧ ~~7~~ 0.1% , 0.2% delmopinol (mouth wash.)
- sign. reduction in dextran-producing streptococci
  - no colonisation by *Candida* or  $G^-$  <sup>aerob.</sup> bact.
  - no  $\downarrow$  in susceptibility to delmopinol  
(study for ~~36 weeks~~ 6 mo.)

- ⑨ ~~8~~ antiseptic solutions (for venous leg ulcers)
- aluminium acetotartrate (AIsol) 1%
  - potassium permanganate 0.015%
  - acetic acid 0.25%
  - Chloramine 0.25%

organisms found in leg ulcers:

- staph. aureus 79%
- $G^-$  rods 39%
- *S. epid.* 21%
- *Proteus* spp. 21%
- *Pseudom.* spp. 14%
- No fungi

- \* alum. acet. , K. perm. , Chloramine reduced the # of bacteria (non-signif.)
- \* Acetic acid reduced *S. aureus* ( $P=0.002$ )
- \* " " "  $G^-$  rods ( $P=0.03$ )
- \* Chloramine reduced  $G^-$  rods ( $P=0.03$ )
- \* *Pseud.* , *Proteus* , *S. epi* , *Strep. faec.* <sup>G</sup> were reduced (non-signif.)

⑩ ⑧

## Alkaloids

Berberine

palmitine

Sanguinarine

may have an anti-inflammatory action through inhibition of DNA synthesis in activated lymphocytes

- Inhibit the multiplication of bacteria, fungi and viruses

• Sanguinarine → inhibits choline acetyltransferase

• Berberine, palmitine → active at the  $\alpha$ -2 receptor

• Berberine & Sanguinarine intercalate DNA, inhibit DNA synthesis and reverse transcriptase

• Sanguinarine affects membrane permeability

• Berberine affects protein biosynthesis

⑪ ⑩

## 13-hexylberberine

Several 13-alkyl substituted analogs of berberine and palmitine are <sup>highly</sup> active against Staph. aureus.

- 13-hexyl berberine
  - 13-hexyl palmitine
- } 8X, 4X as active as Kanamycine sulfate

⑫ ⑪

## Povidone-iodine

iodine and iodophors efficacious against meth. resist-Staph. aureus (MRSA), Enterococcus

- no develop. of resistance

- excellent local tolerability of Betaisodona preparations



~~12~~ Povidone-iodine, Na hypochlorite

13 Killed *X. maltophilia*, *S. marcescens*.

\* Chlorhexidine 0.2%

didn't kill ~~the~~ *X. maltophilia*, *S. marcescens* (after 10 min.)

\* Benzalkonium 0.02%

Killed *X. maltophilia*

(0.1% was needed to kill *S. marcescens*)

\* Tego-51 (?)

0.02% Killed *X. maltophilia*

~~13~~ Peroxyacetic acid (local antiseptic)

14

2/4/00

Initial experiments: PCMX in MeOH + 50% aq. NaOH added to GV in MeOH, stirred for 1 h. Then evaporated solvent. Dissolved residue in DCM

Catheter	MRSA	Ps	C. Parap.
ET-PVC	23:22:25	12:0:19	22:25:25
Si	16:16:20	12:5:12	17:17:18
PU	20:21:19	16:16:15	23:25:21
Silk	12:12:16	0:0:0:0	12:12:13

$GV^+ \cdot OH^-$ , prepared by adding 50% aq. NaOH to GV in MeOH, stirring for 1 h, evaporating solvent, dissolving residue in DCM.

	MRSA	Ps	C. Parap.
PVC	20:20	0:0	17:17
Si	16:16	5:7	14:14
PU	20:20	14:15	25:25
Suture	13:14	0:0	12:12

$GV^+ \cdot OH^-$ , prepared by adding 50% aq. NaOH to GV in water, stirring for 1 h, evaporating solvent, dissolving residue in DCM.

	MRSA	Ps	C. Parap.
PVC	23:23	0:0 J	22:22
Si	18:19	9:9	13:16
PU	23:23	17:17	21:21
Suture	17:17	3:4	13:14

$GV^+ \cdot OH^- \cdot PCMX$ , prepared by adding 50% aq. NaOH to GV in water, stirring for 1 h, evaporating solvent, dissolving residue in DCM. Then added PCMX

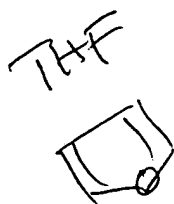
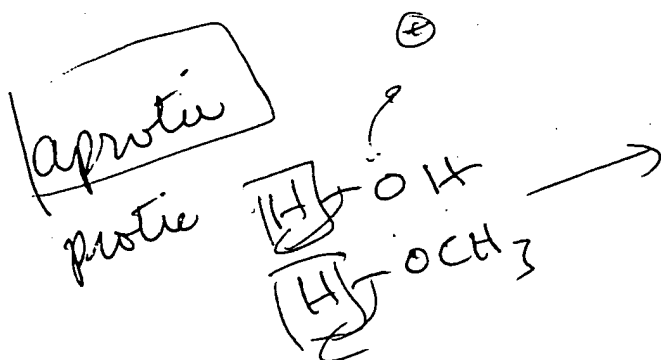
	MRSA	Ps	C. Parap.
PVC	22:22	0:0	20:20
Si	21:20	6:10	17:18
PU	25:25	14:14	24:26
Suture	15:16	3:3	13:14

$GV^+ \cdot PCMX$ , prepared by adding methanolic sodium methoxide to PCMX in MeOH, then the resulting mixture is added to GV in MeOH, stirring for 1 h, evaporating the solvent, then dissolving residue in DCM

	MRSA	Ps	C. Parap.
PVC	21:20	0:0	20:20
Si	18:18	10:10	25:25
PU	21:21	15:15	29:29
Suture	12:13	0:0	13:13

$GV^+ \cdot ^-OCH_3$ , prepared by adding methanolic sodium methoxide to GV in MeOH, stirring for 1 h, evaporating the solvent, then dissolving residue in DCM

	MRSA	Ps	C. Parap.
PVC	21:20	0:0	20:20
Si	18:19	9:9	25:25
PU	21:21	15:15	28:29
Suture	15:15	0:0	10:13



Comparison between MeOH and DCM solutions of GV.

Catheter	GV in MeOH			GV in DCM ✓		
	MRSA	Ps	C. Parap	MRSA	Ps .	C. Paráp
ET-PVC	20-21	0-0	18-19	31-27	18-18	28-31
Si	7-8	0-0	0-0	10-10	0-0 ✓	0-7
PU	32-32	24-26	31-32	24-24	18-18	25-25
Silk	10-11	0-0	0-0	9-9	0-0	0-0

26

15  
2

1/27/00

Dr. Raad..

This report is to update you on where we are with Gentian violet & PCMX.

I have not received *Clofocetol*. I'll try to recover what we had from the first trials.

Nabeel

1/27/00

Summary of work with  $GV^+ \cdot PCMX^-$ 

Recall that  $PCMX^- Na^+$  was added to GV in methanol, and residue resulting from evaporation of methanol was dissolved in DCM. Table 1 shows zones of inhibitions obtained from this first attempt with DCM.

Table 1.

Catheter	$GV^+ \cdot PCMX^-$ in DCM		
	MRSA	Ps	C. Parap.
ET-PVC	25	19	25
Si	20	12	18
PU	19	15	21
Silk	16	0:0	13

polyvinyl chlor.  
silicone  
polyurethane  
silk suture

dichloromethane  
methylene chloride

✓ p-chloro - methyl 3,5-dimethyl  
cresol

The experiment was repeated as follows:

Sodium hydroxide, 0.59 ml of 50% NaOH, was added to 1.15 g (7.35 mmol) of PCMX in 35 ml MeOH. The resulting solution was added dropwise to a solution of GV (3 g; 7.35 mmol) in 150 ml MeOH, and the resulting solution was stirred at ambient conditions for 1 h. The precipitate was filtered under vacuo. The filtrate was placed under the hood over night, allowing the solvent to evaporate. The resulting residue (3.279 g) was used without purification, of which 1.1 g was dissolved in 30 ml DCM for impregnating catheters. Results are given in Table 2.

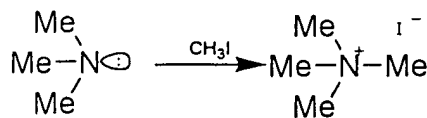
Table 2.

Catheter	$GV^+ \cdot PCMX^-$ in DCM		
	MRSA	Ps	C. Parap.
ET-PVC	22:23	12:0	22:25
Si	16:16	12:5	17:17
PU	20:21	16:16	23:25
Silk	12:12	0:0	12:12

how do you  
determine  
that time?

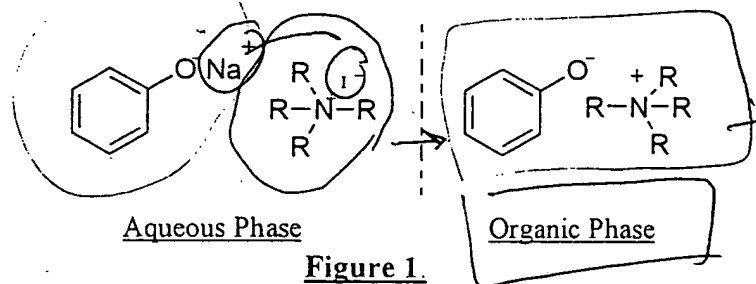
PVC & Si were immersed for 2 min.  
PU was immersed for 20 sec.  
Silk suture was immersed for 2 h.

In order to optimize the procedure, it is important to examine the chemistry closely. Careful examination of GV reveals that it is not a true quaternary amine. Quaternary amines have a net positive charge localized on the nitrogen because their lone-pair electrons are involved in covalent bonding with a nucleophilic center. An example is tetramethylammonium iodide (Equation 1).



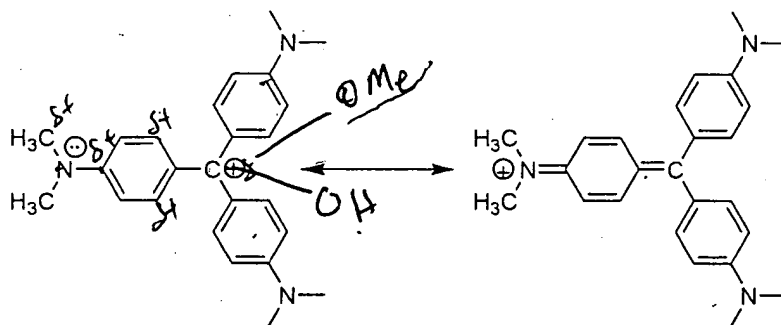
Eq. 1

Quaternary ammonium compounds (Quats) are used as phase-transfer catalysts (PTC) for solvating organic salts in organic media by increasing the lipophilicity of the organic salt via formation of an ionic compound with the PTC (Figure 1).



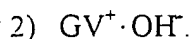
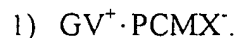
*Sorption*

The case is different for Gentian violet. It is not a true quat. It is an amine with a benzylic carbonium center, which is stabilized by resonance through, in addition to the phenyl rings, delocalizing of the lone-pair of the nitrogens via resonance:



As a result, the positive charge is not localized on the nitrogen. Briefly, and depending on the resonance hybrid of GV, it can form ionic compounds with organic salts, and depending on the basicity of the nucleophile, can form covalent adducts at the carbonium center. In other words, the presence of polar protic solvents can compete with the nucleophile.

In the case of PCMX, water, methanol can react with GV at the carbonium center in the presence of a proton acceptor. The phenoxide derivative of PCMX is not a strong nucleophile, but can accept a proton from a hydronium ion. This implies multiple product formation when PCMX is added to a solution of GV in methanol and the presence of water. In other words, the following can result from addition of PCMX to GV in alcoholic aqueous media:



The sure way to shed more light on the results on hand, preparing each of these possible reagents and testing their impregnating ability and zones of inhibitions will help shed more light onto the results on hand.

The following results summarize work to date.

Table 3.

GV <sup>+</sup> · OH/MeOH			
	MRSA	Ps	C. Parap.
PVC	20:20	0:0	17:17
Si	16:16	5:7	14:14
PU	20:20	14:15	25:25
Suture	13:14	0:0	12:12

Table 4.

GV <sup>+</sup> · OCH <sub>3</sub> /MeOH			
	MRSA	Ps	C. Parap.
PVC	21:20	0:0	20:20
Si	18:19	9:9	25:25
PU	21:21	15:15	28:29
Suture	15:15	0:0	10:13

Table 5.

GV <sup>+</sup> · PCMX/MeOH			
	MRSA	Ps	C. Parap.
PVC	21:22	0:0	20:20
Si	18:18	10:10	25:25
PU	21:21	15:15	29:29
Suture	12:13	0:0	13:13

Two more experiments in this series are undergoing.

- The experiment employing acetonitrile as a solvent was accidentally spilled.
- I'll set up the rifampin experiment as soon as possible.



# **APPENDIX 2**

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

*In re* Application of:

Issam RAAD, Hend A. HANNA, and Nabcel  
NABULSI

Group Art Unit: 1744

Examiner: Jastrzab, Krisanne Marie.

Serial No.: 10/044,842

Atty. Dkt. No.: UTSC:669US

Filed: January 11, 2002

For: NOVEL ANTISEPTIC DERIVATIVES  
WITH BROAD SPECTRUM  
ANTIMICROBIAL ACTIVITY FOR THE  
IMPREGNATION OF SURFACES

**DECLARATION OF DR. ISSAM RAAD UNDER 37 C.F.R. § 1.132**

I, Dr. Issam Raad, hereby declare as follows:

1. I am one of the inventors of the above-referenced patent application. I am a citizen of the U.S., currently residing at 4207 Clearwater Ct., Missouri City, TX, 77459.
2. Attached as Exhibit 1 of this declaration is a summary of results of studies conducted in my laboratory by me and Dr. Hend Hanna, one of my co-inventors, pertaining to the preparation of antiseptic compositions of a dye and a basic reagent, and studies to evaluate the effectiveness of these compositions as antiseptics and as coatings of gloves and medical devices.
3. Pages 1-3 of Exhibit 1 describes studies reporting the antiseptic efficacy of gloves coated with various combinations of a dye and a basic reagent. We studied the antiseptic efficacy of gardine, a solution of brilliant green dye and chlorhexidine, prepared in various solvents as set forth on page 1 of Exhibit 1. Our results indicate that all compositions that included a dye and basic reagent showed excellent efficacy as an antiseptic coating of gloves, with zones of

inhibition being comparable with no leaching.

4. We also measured the antiseptic efficacy of compositions of brilliant green dye and chlorhexidine (gardine) as an antiseptic mouthwash. Exhibit 1, page 4. Our results show that while brilliant green dye or chlorhexidine alone had MINIMAL OR NO effect as an antiseptic, a combined solution of the two was extremely effective as an antiseptic, as there was more than an additive effect in killing bacteria and yeast compared to either agent alone. In another study, we show that gardine is an excellent antiseptic alcohol free mouthwash, with an antiseptic efficacy comparable to three well-known mouthwashes. Exhibit 1, page 4.

5. We also conducted studies evaluating the antiseptic efficacy of central venous catheters coated with chlorhexidine in combination with one of the selected dye from a group of Erythrosin B, Sudan III, Fast Green, Brilliant Green, Solvent Green 3, Quinoline Yellow, Indigo Carmine, Gentian Violet and Tartrazine. Exhibit 1, pages 6-8. Our results show that the combination of chlorhexidine and each of the dyes was extremely effective as an antiseptic coating, and that antiseptic efficacy was more than additive compared to either dye or chlorhexidine alone. Exhibit 1, pages 6-8.

6. These results clearly establish that the combination of a dye and basic reagent exhibits surprising and unexpected superiority as an antiseptic than either the dye alone or the basic reagent. Antiseptic efficacy of the composition of a dye and basic reagent was more than additive of either the dye alone or the basic reagent alone.

7. I hereby declare that all statements made by my own knowledge are true and all statements made on information and belief are believed to be true and further that statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment under § 100 of Title 18 of the United States Code, and that such willful

false statements may jeopardize the validity of this application or any patent issued thereon.

Date 5/11/06

IR000  
Issam Raad

# **EXHIBIT 1**

## Using dyes, other than Gentian Violet, in novel antiseptic

### I. Coating gloves with novel antiseptic:

**Objective:** To measure bacteria growth after exposure to antiseptic coated gloves.

**Background:** Gardine is a solution of **brilliant green dye and chlorohexidine**, which can be, used as antiseptic coating. Chlorhexidine has previously been used as an environmental antiseptic as well as with mouthwash. Gloves are often associated with the spread of bacteria not only in a hospital setting but also with household use. Our goal is to develop a glove that inhibits the spread of bacteria.

#### **Materials and Methods:**

##### **Antiseptic coating procedure –**

###### **Gloves –**

1. Latex – Spontex One Use Disposable Latex Exam Gloves
2. Nitrile – Mapa Professional Solo Ultra Blue Nitrile Exam Gloves

###### **Coating –**

Whole gloves were coated in a solution of Gardine with varying solvents for 30 seconds. Gardine is a solution of 0.1g Brilliant Green added to 30mL solvent. Once completely dissolved, 1.264g Chlorohexidine (CHX) was added to the solution and stirred for 1 hour until completely dissolved. Three different mixtures of solvent, designated Gardine – D (solvent = methylene chloride), Gardine – A (solvent = acetone), and Gardine A-10 (solvent = acetone + 10% water), were tested for efficacy of antiseptic and integrity of polymer after coating. Gloves were placed on hand molds, dipped for 30 seconds and dried under the hood at ambient conditions overnight. They were then washed 3 times (ddH<sub>2</sub>O, ddH<sub>2</sub>O + detergent, ddH<sub>2</sub>O) for 1 minute each. Gloves were then again dried overnight under the hood at ambient conditions

##### **Antiseptic efficacy:**

Coated gloves were tested for antiseptic efficacy based on an assay developed by American Association of Textile Chemists and Colorists (AATCC) for use on fabric. (AATCC Method 30)

Methicillin resistant *Staphylococcus aureus* (MRSA 4798) and *Escheria coli* (EC 2131) were grown in Muller Hinton broth and diluted to 0.5 McFarland turbidity. Coated and uncoated control gloves were cut to 1cm squares. Bacteria was swabbed on the outer surface of the glove square and dried in ambient conditions for various times (0 minutes, 10 minutes, 30 minutes, and 60 minutes). After the appropriate time period glove squares were placed face down and streaked across a Muller Hinton agar plate. Plates were then incubated inverted at 37C for 24 hours. After 24 hours, plates were scored for growth or no growth for each of the glove squares.

##### **Zone of Inhibitions:**

After drying, segments were tested for antiseptic ability using the modified Kirby-Bauer method. Segments were tested for Zones of Inhibition (ZOIs) against Methicillin Resistant *Staph aureus* 4798 (MRSA 4798) and *Psuedmonas aeruginosa* 4689 (PS 4689). Muller Hinton II plates were spread with microorganisms at a 0.5 McFarland concentration. Segments were placed on top of the agar. Plates were inverted and incubated at 37°C for 24 hours. Zones of inhibition (ZOI) were measured in

millimeters (mm) across the diameter of the zone and segment. Observations of leaching were noted for comparison.

**Results:**

**Antiseptic Efficacy:**

	Latex Exam MRSA			
	Uncoated	Gardine - D	Gardine - A	Gardine - A10
0 min	Heavy Growth	No Growth	No Growth	No Growth
10 min	Heavy Growth	No Growth	No Growth	No Growth
30 min	Heavy Growth	No Growth	No Growth	No Growth
60 min	Heavy Growth	No Growth	No Growth	No Growth
	Nitrile Exam MRSA			
	Uncoated	Gardine - D	Gardine - A	Gardine - A10
0 min	Heavy Growth	No Growth	No Growth	No Growth
10 min	Heavy Growth	No Growth	No Growth	No Growth
30 min	Heavy Growth	No Growth	No Growth	No Growth
60 min	Heavy Growth	No Growth	No Growth	No Growth
	Latex Exam E. coli			
	Uncoated	Gardine - D	Gardine - A	Gardine - A10
0 min	Heavy Growth	No Growth	No Growth	No Growth
10 min	Heavy Growth	No Growth	No Growth	No Growth
30 min	Heavy Growth	No Growth	No Growth	No Growth
60 min	Heavy Growth	No Growth	No Growth	No Growth
	Nitrile Exam E. coli			
	Uncoated	Gardine - D	Gardine - A	Gardine - A10
0 min	Heavy Growth	No Growth	moderate growth	No Growth
10 min	Heavy Growth	No Growth	No Growth	No Growth
30 min	Heavy Growth	No Growth	No Growth	No Growth
60 min	Heavy Growth	No Growth	No Growth	No Growth

**Zones of Inhibition:**

	Zones of Inhibition diameter = 5mm				Leaching
	MRSA 4798		EC 2131		
Gardine D - Latex Exam	15	15	13	13	no leaching
Gardine A - Latex Exam	14	14	11	11	no leaching
Gardine A10 – Latex Exam	15	15	10	9	no leaching
Gardine D- Nitrile Exam	17	17	15	14	no leaching
Gardine A - Nitrile Exam	15	15	15	14	no leaching
Gardine A10 – Nitrile Exam	14	13	12	11	no leaching

**Observations:**

- All zones of inhibition and antiseptic efficacy are comparable between different solvents tested.
- Gardine A and Gardine A10 do not show staining.
- Gardine A10 shows most homogenous fluidity in coating solution.



## II. Novel mouthwash using novel antiseptic:

**Table 1:** Synergism of chlorhexidine and brilliant green in solutions against free-floating microorganisms. One solution (0.008/0.012%) was tested against MRSA only, expressed as CFU/disk.

	<i>Klebsiella pneumoniae</i> CFU*	MRSA CFU*	<i>Candida albicans</i> CFU*
Saline (Control)	>5000	>5000	>5000
0.004 mg/mL brilliant green	>5000	>5000	>5000
0.008 mg/mL brilliant green	>5000	>5000	>5000
0.006 % chlorhexidine	>5000	>5000	400
0.004 mg/ml brilliant green + 0.006% chlorhexidine	0	0	0
0.008 mg/ml brilliant green + 0.006% chlorhexidine	0	0	0
0.012 % chlorhexidine	0	>5000	100
0.008 mg/ml brilliant green + 0.012% chlorhexidine	0	0	0

\* CFU = colony forming units; MRSA = methicillin-resistant *Staphylococcus aureus*

**Table 2:** Synergism of chlorhexidine and brilliant green in solutions against *Candida albicans* biofilm form, expressed as CFU\*/disk.

Solution	<i>Candida albicans</i> Mean CFU/disk $\pm$ SE
Saline (control)	>5000, >5000, >5000
0.008 brilliant green	>5000, >5000, >5000
0.012 chlorhexidine	>5000, >5000, >5000
0.024 chlorhexidine	>5000, >5000, >5000
0.008 brilliant green + 0.012 chlorhexidine	0, 0, 0
0.008 brilliant green + 0.024 chlorhexidine	0, 0, 0

\*CFU = colony forming units; MRSA = methicillin-resistant *Staphylococcus aureus*

**Table 3:** Efficacy of alcohol-free chlorhexidine and brilliant green solution and three alcohol-containing mouthwashes, against four microorganisms (free floating), expressed as CFU\*/disk

Solution	MRSA	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella pneumoniae</i>	<i>Candida albicans</i>
Saline (Control)	>5000, >5000, >5000	>5000, >5000, >5000	>5000, >5000, >5000	>5000, >5000, >5000
0.004 brilliant green + 0.04% chlorhexidine	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
Periogard®	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
Listerine®	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
Scope®	50, 0, 0	1000, 0, 0	0, 0, 0	0, 0, 0

\* CFU = colony forming units; MRSA = methicillin-resistant *Staphylococcus aureus*

## II. Coating Central Venous Catheters (CVC)

Experiment 1: Ethacridine solutions for coating CVC were prepared as follows:

- 0.5 g Ethacridine + 30 mLs Isopropanol
- 1.264 g Chlorhexidine + 30 mLs Isopropanol
- 0.5 g Ethacridine + 1.264 g Chlorhexidine in 30 mLs Isopropanol

### RESULTS

	Silicone
Ethacridine	17 : 16
Chlorhexidine	15 : 14
Ethacridine + Chlorhexidine	15 : 15

### Baseline study for Various Dyes in Acetone:

**Purpose:** This is a direct repeat of a previous study with all of these dyes using DCM, but with Acetone as the solvent, to test for zones of inhibition.

#### **Dyes used:**

- Erythrosin B
- Sudan III
- Fast Green
- Brilliant Green
- Solvent Green 3
- Quinoline Yellow
- Indigo Carmine

Solutions were prepared as follows:

**Erythrosin B:** 2.2 g Erythrosin B (EB)  
1.264 g CHX  
0.846 g Et<sub>4</sub>N<sup>+</sup>Cl  
50 mL Acetone

**Sudan III:** 1.032 g Sudan III (SIII)  
1.264 g CHX  
50 mL Acetone  
10 mL Methanol

**Fast Green:** 1.013 g Fast Green (FG)  
1.264 g CHX  
0.207 g Et<sub>4</sub>N<sup>+</sup>Cl

**Brilliant Green:** 1.206 g Brilliant Green (BG)  
1.261 g CHX  
50 mL Acetone

**Solvent Green 3:** 1.057 g Solvent Green 3 (SG3)  
1.264 g Chlorhexidine (CHX)  
30 ml Acetone

**Quinoline Yellow:** 0.683 g Quinoline Yellow (QY)  
1.264 g CHX  
50 mL Acetone

**Indigo Carmine:** 1.166 g Indigo Carmine (IG)  
1.264 g CHX  
0.423 g tetraethylammoniumchloride ( $\text{Et}_4\text{N}^+\text{Cl}$ )  
30 mL Acetone

Silicone catheter segments were soaked for 2 hours, and the polyurethane (PU) catheter segments were soaked for 10 minutes.

\*At the end of the 2 hour soaking of the silicone catheter pieces in **Quinoline yellow (QY)**, the container was spilled under the fume hood, the segments were still tested, but no solution was left to test the PU pieces in QY.

All the catheter segments were removed, patted dried, and left under the fume hood to dry overnight. The catheter segments were washed the next day.

#### Physical properties of the pieces

<i>Dye Used</i>	<b>Color</b>	<b>Color pattern</b>	<b>Color change after washing</b>	<b>PU observations</b>
<b>Erythrosin B</b>	Cherry	Even	Slight color change	PU pieces brighter
<b>Sudan III</b>	Pink-Red	Even coloring	Slight color change	PU pieces Dark Red/Brownish
<b>Fast Green</b>	Light Blue	Uneven coloring	Color washed off	They were darker and evenly colored
<b>Brilliant Green</b>	Teal	Even		PU pieces lost most of their coloring
<b>Solvent Green 3</b>	Light / Dark Blue	Evenly colored	Slight color change	PU pieces were really dark blue
<b>Quinoline Yellow</b>	Yellow	Even coloring	Slight color change	No PU pieces due to spill
<b>Indigo Carmine</b>	Silvery Blue	Uneven coloring	Color washed off	PU pieces darkest

#### Results: All pieces plated in Mueller Hinton II Agar with MRSA 2066

<b>Catheter</b>	<b>EB</b>	<b>SIH</b>	<b>FG</b>	<b>BG</b>	<b>SG3</b>	<b>QY</b>	<b>IC</b>
<b>Septa</b>	0 : 0	42 : 40	39 : 34	43 : 42	42 : 40	45 : 43	36 : 36
<b>Port</b>	5 : 4	0 : 0	11 : 11	10 : 10	12 : 11	10 : 9	15 : 13
<b>Pheresis</b>	6 : 6	0 : 0	12 : 14	17 : 13	16 : 14	17 : 12	17 : 17
<b>Peritoneal</b>	0 : 0	0 : 0	18 : 14	14 : 13	18 : 14	12 : 10	Fell out 0 : 0
<b>PU</b>	14 : 13	47 : 48	48 : 48	56 : 56	50 : 52	No pieces	51 : 51

**Experiment 2: Soak time of Silicone catheters in various Antiseptic Dyes versus Zones of inhibition in MRSA 2066.**

**Purpose:** Repeat the various dye baseline experiment (2 hour soak time), and compare to pieces that are soaked for 72 hours and 96 hours.

**Dyes tested:**

- Quinoline Yellow (QY)
- Indigo Carmine (IC)
- Tartrazine (T)
- Brilliant Green (BG)

Reasons for the selection of these dyes:

Quinoline Yellow, Indigo Carmine, and Tartrazine are all FDA approved for use in food, cosmetics, and drugs.

Brilliant green Therap cat (vet): Antiseptic for external and internal (oral) use, also for wounds.

**RESULTS (zones of inhibition in mm)**

	<b>Septa</b>	<b>Pheresis</b>	<b>Peritoneal</b>	<b>Port</b>	<b>Polyurethane</b>
<b>QY</b>	36 : 42 0 : 22 28 : 26	0 : 0 0 : 0 10 : 12	0 : 0 0 : 0 11 : 8	0 : 0 0 : 0 0 : 0	43 : 44
<b>IC</b>	34 : 30 0 : 0 36 : 34	9 : 7 10 : 9 7 : 9	13 : 11 11 : 0 (fell) 12 : 10	0 : 0 0 : 0 0 : 0	40 : 42
<b>T</b>	35 : 39 26 : 25 38 : 40	14 : 14 15 : 17 12 : 13	14 : 9 16 : 14 13 : 15	13 : 13 14 : 9 12 : 13	50 : 51
<b>BG</b>	40 : 40 30 : 34 34 : 34	14 : 12 13 : 13 8 : 10	13 : 14 11 : 19 19 : 8	8 : 7 8 : 7 7 : 6	44 : 45

Baseline

72 hour incubation

96 hour incubation

**Observations for the 72 hours and 96 hours segments (appeared to have similar appearance):**

At washing the pieces still felt the same to the touch, but had different coloring.

Segments coated with QY had spots all throughout it.

Segments coated with IC became opaque.

Segments coated with BG were dark green, when compared to the light green after a 2-hour soaking.

Segments coated with Tartrazine became opaque.

**Experiment 3: Baseline results for Indigo Carmine (IC) and Brilliant Green (BG) in Acetone, EtOH, Isopropanol or Ak-225 on Arrow catheter pieces.**

The following is a listing of the types of catheters being used:

- 4 Fr. PICC (PICC)
- 7 Fr. Tri-Lumen (3-L)
- Hemodialysis (Hemo)
- Radial Artery (RA)
- Sheath Introducers (SI)

The dyes were prepared as follows:

**Brilliant Green-based solution**

1.206 g BG + 1.264 g CHX

in 50 mL of solvent (either Acetone, Ethyl Alcohol, Isopropanol, or Ak-225)

**Indigo Carmine-based solution**

1.166 g IC + 1.264 g CHX (Chlorhexidine)

in 30 mL of solvent (either Acetone, Ethyl Alcohol, Isopropanol, or Ak-225)

**Quinoline Yellow-based solution**

0.683 g QY + 1.264 g CHX

in 50 mL of solvent (either Acetone, Ethyl Alcohol, Isopropanol, or Ak-225)

The solution was stirred for 1 hour before adding the pieces, and all of the pieces were soaked for 2 hours without stirring, and then dried under the fume hood at room temp for 24 hours.

The pieces were then washed using water, dried, sterilized using the sterad process, and plated in Muller Hinton II agar plates containing MRSA 2066.

**RESULTS:**

Dye	PICC	3-L	Hemo	RA	SI 1 (blue)	SI 2 (White)
BG	34 : 33	40 : 40	40 : 38	No plate	15 : 16	36 : 42
	31 : 31	40 : 40	44 : 42	25 : 26	14 : 14	44 : 38
	33 : 32	43 : 44	44 : 44	24 : 24		41 : 42
IC	32 : 32	42 : 42	40 : 40	23 : 24	5 : 8	40 : 40
	32 : 32	40 : 40	42 : 38	19 : 25	4 : 5	38 : 40
	34 : 35	40 : 44	48 : 44	23 : 23		44 : 41
QY	31 : 30	42 : 42	44 : 44	22 : 22		40 : 41
	33 : 31	45 : 46	44 : 41	22 : 22		44 : 43
	36 : 35	46 : 44	44 : 44	24 : 25		41 : 43

Acetone

Ethyl Alcohol (EtOH)

Isopropanol

Ak-225

Observations: BG and IC (Acetone or EtOH) did not coat the pieces evenly. The pieces were somewhat difficult to wash, some of the darker stained spots on the pieces washed away after rubbing the pieces, but some of the spots remained after washing.

The QY pieces were evenly coated.

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